

US CONNECT 2022 IN ATLANTA



Integration of SAS® LSAF and Veeva using REST APIs

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May 02 2022



Agenda

- Introduction to Clinical Data Repository (CDR)
- Introduction to Veeva Systems for CTMS & CDMS.
- Integration of 3rd party systems with CDR.
- Process of creating CDR integration with Veeva Vault.

Introduction to Clinical Data Repository (CDR)

SAS® Life Science Analytics Framework - Repository

/LSAF_Training/Wonder_Drug/Pain/PainXD101/Programs/Dev

Repository

- Clinical Development
- LSAF_Training
 - Wonder_Drug
 - Pain
 - PainXD101
 - Data
 - DataStandards
 - Documents
 - Formats
 - Logs_Results_M...
 - Macros
 - Outputs
 - Programs
 - Dev
 - Prod
 - Test
 - PainXD102
 - PainXD103
 - training
 - Course_info
 - SAS
 - Users

Text to filter 15 repository items

	1 ↑	Name ↑	Size	Modified By	Date Modified	Sig...	Repository ...	Workspace ...
☐		BPI_PctChBL - Copy.job	791 bytes	Ben Bocchicchio	Feb 18, 2022, 1:42 PM...		-	
☐		BPI_PctChBL_parameter.j...	997 bytes	Trainer One	Oct 15, 2021, 3:01 PM ...		-	✓
☐		BPI_PctChBL_parameter...	4.8 KB	Trainer One	Oct 15, 2021, 3:01 PM ...		-	✓
☐		BPI_PctChBL.job	791 bytes	Ben Bocchicchio	Feb 17, 2022, 3:01 PM...	✓	-	⚠ -
☐		BPI_PctChBL.sas	4.83 KB	Ben Bocchicchio	Mar 17, 2022, 8:55 AM...		1.1	⚠ -
☐		createEmptySDTM.job	686 bytes	Trainer One	Oct 15, 2021, 3:01 PM ...		-	✓
☐		createEmptySDTM.sas	52.28 KB	Trainer One	Oct 15, 2021, 3:01 PM ...		-	✓
☐		dm_listing.job	789 bytes	Trainer One	Oct 15, 2021, 3:01 PM ...		-	✓
☐		dm_listing.sas	1.04 KB	Pritesh Desai	Apr 4, 2022, 2:30 PM ...		-	✓
☐		dm_print.job	634 bytes	Trainer One	Oct 15, 2021, 3:01 PM ...		-	✓
☐		dm_print.sas	998 bytes	Pritesh Desai	Feb 28, 2022, 4:35 PM...		1.4	✓
☐		loadadsl.job	784 bytes	Trainer One	Oct 15, 2021, 3:01 PM ...		-	✓
☐		loadadsl.sas	189 bytes	Trainer One	Oct 15, 2021, 3:01 PM ...		-	✓
☐		output_via_relative_path.job	821 bytes	Trainer One	Oct 15, 2021, 3:01 PM ...		-	✓
☐		output_via_relative_path...	321 bytes	Trainer One	Oct 15, 2021, 3:01 PM ...		-	✓

Clinical Data Repository



What is single version of truth ?

E.g. Where will your final EDC,
CDISC & submission file reside?

PINNACLE²¹  **medidata**

Product is SAS Life Science
Analytics Framework (LSAF)

Integration (EDC, Pinnacle 21, Rave,
Ryze, Veeva, process flow automation)



Architecture

Delivered as SaaS
(Cloud Env.)



WebDAV (Terminal mount)

Recommended just for review or
migration to NAS



API



Optional-Auto Sync

Sync data everyday or more frequently

Introduction to Veeva Systems for CTMS & CDMS.

Veeva Vault

Vault Clinical SBX

Studies Search Recent Studies 🔍

ctms01   

Home **Study Info** Planning Risk Management Library TMF Management Study Management Site Monitoring Central Monitoring Reports Issue Management   

Views 

 All Studies

 **Recent Studies**

 Favorites

FILTERS 

MILESTONE MASTER SET

☒ All

☐ Standard Study Level 3 [Advanced](#)

CDMS CONNECTION

☒ All

☐ (undefined) 3 [Advanced](#)

Recent Studies 1-3 of 3 

Study Number	Lifecycle State	Milestone Master Set	Protocol Title	CDMS Connection
★ AVEG 027	Active	Standard Study Level	A global, randomized, multi-center study of safety and efficacy of Navebva for patients with Acute Myeloid Leukemia (AML).	
★ AVEG 111	Candidate	Standard Study Level	A Randomized Phase II Efficacy, Activity and Safety Study of GLO223 Alone and in Combination With Zidovudine in Symptomatic HIV-infected Patients Without Prior Treatment With GLO223 or Trichosanthin	
★ ETB 050	Candidate	Standard Study Level	A Randomized Phase III Safety and Immunogenicity Trial of Live Recombinant Canarypox ALVAC-HIV vCP205 Delivered by Alternate Mucosal Routes in HIV-1 Uninfected Adult Volunteers	

Vault CDMS SBX

Subjects Search Subjects 🔍

cdms01   

Data Entry Library **Review** Assessments Studio   

 > TopazStudy_DEV1  > Search Study Site 

Sites (2)

Queries (1)

Listings & Exports (0)

Job Schedule (0)

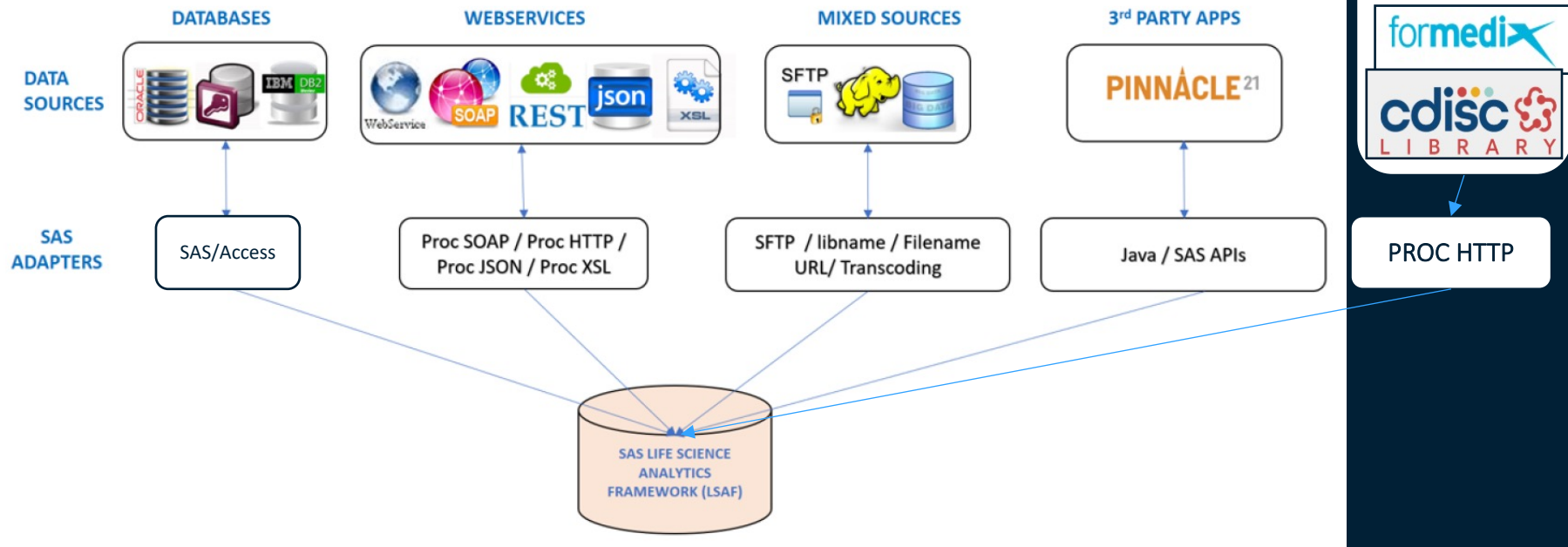
Sites

Search  Site Status: All 

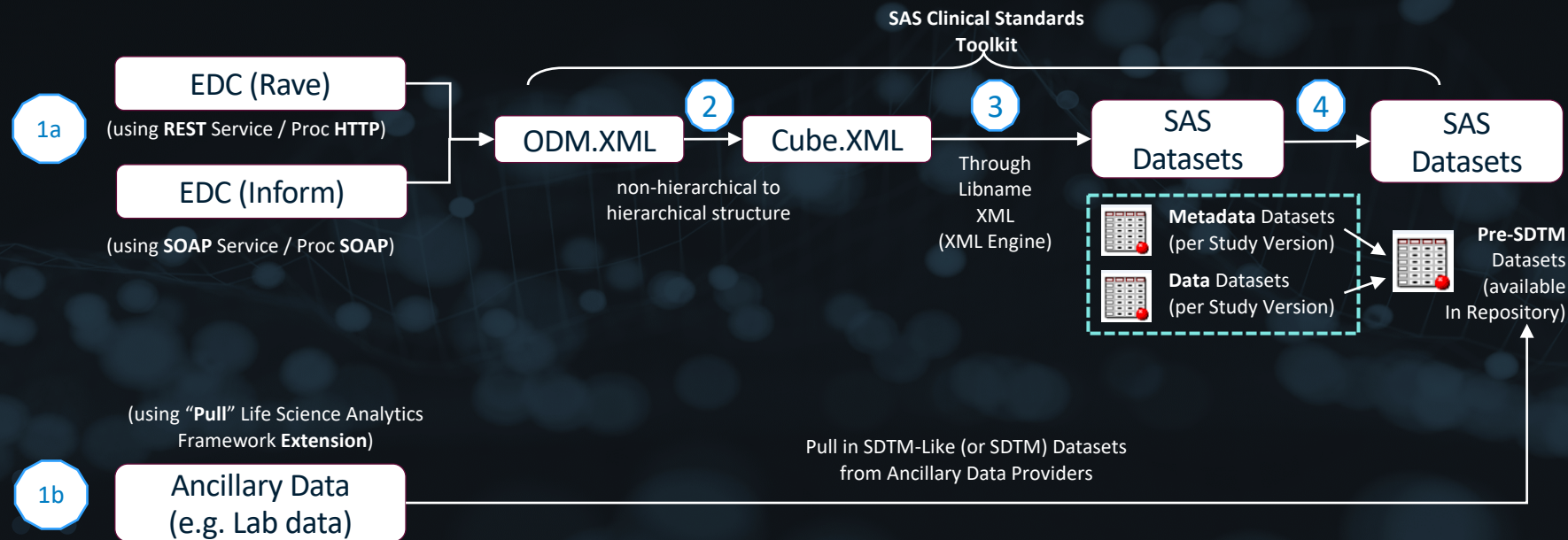
1-2 of 2

Site Name	Site Number	Site Status	Principal Investigator	Subjects
Dublin Hospital	101	Active	Janet Smith	1
Manchester Hospital	301	Active	John Smith	

Integration of 3rd party systems with CDR



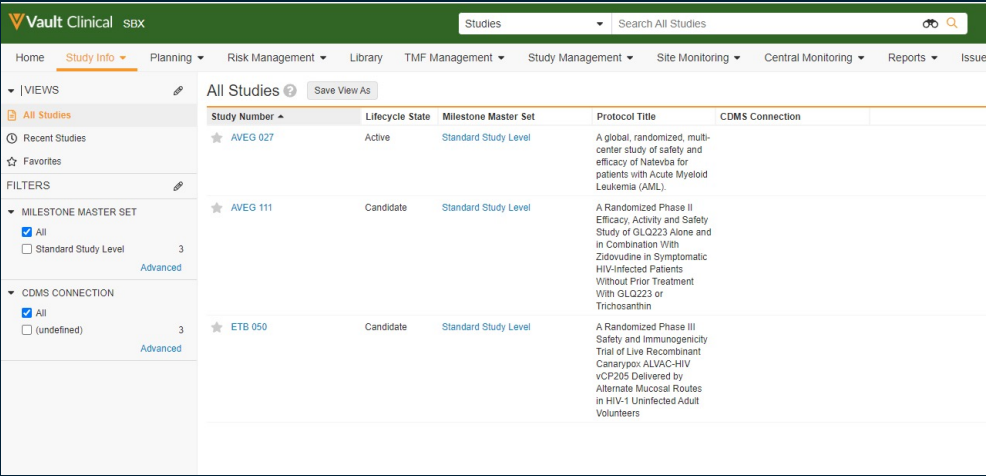
Data Extraction Flow



Process of creating CDR integration with Veeva Vault

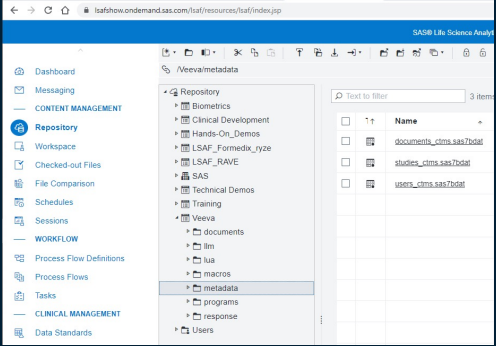
Source

Target



The screenshot shows the Veeva Vault Clinical interface. The top navigation bar includes 'Home', 'Study info', 'Planning', 'Risk Management', 'Library', 'TMF Management', 'Study Management', 'Site Monitoring', 'Central Monitoring', 'Reports', and 'Issues'. The 'Study info' tab is active. Below the navigation bar, there's a search bar for 'Studies'. The main content area displays a table titled 'All Studies' with columns: Study Number, Lifecycle State, Milestone Master Set, Protocol Title, and CDMs Connection. The table lists three studies: AVEG 027 (Active), AVEG 111 (Candidate), and ETB 050 (Candidate). The 'Milestone Master Set' column is highlighted in blue for all entries.

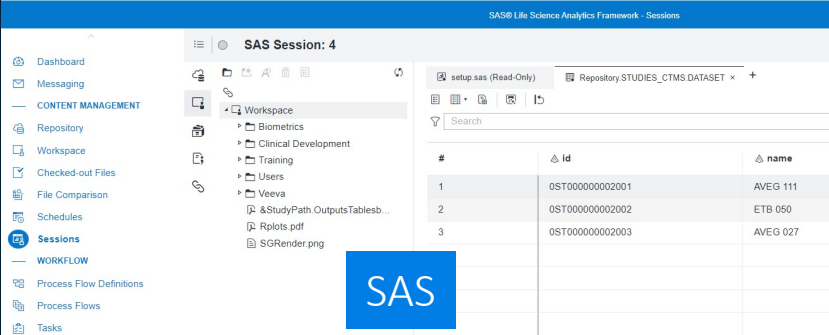
Study Number	Lifecycle State	Milestone Master Set	Protocol Title	CDMs Connection
★ AVEG 027	Active	Standard Study Level	A global, randomized, multi-center study of safety and efficacy of Naveba for patients with Acute Myeloid Leukemia (AML).	
★ AVEG 111	Candidate	Standard Study Level	A Randomized Phase II Efficacy, Activity and Safety Study of GLQ223 Alone and in Combination With Zidovudine in Symptomatic HIV-infected Patients Without Prior Treatment With GLQ223 or Trichosanthin	
★ ETB 050	Candidate	Standard Study Level	A Randomized Phase III Safety and Immunogenicity Trial of Live Recombinant Canarypox: ALVAC-HIV vCP205 Delivered by Alternate Mucosal Routes in HIV-1 Uninfected Adult Volunteers	



The screenshot shows the SAS Life Science Analytics Framework interface. The left sidebar contains a navigation menu with 'Dashboard', 'Messaging', 'CONTENT MANAGEMENT', 'Repository', 'Workspace', 'Checked-out Files', 'File Comparison', 'Schedules', 'Sessions', 'WORKFLOW', 'Process Flow Definitions', 'Tasks', 'CLINICAL MANAGEMENT', and 'Data Standards'. The 'Repository' tab is selected. The main content area displays a tree view of the repository structure, including folders like 'Biometrics', 'Clinical Development', 'Hands-On_Demos', 'LSAF_Formedix_ryze', 'LSAF_RAVE', 'SAS', 'Technical Demos', 'Training', 'Veeva', 'documents', 'lim', 'lua', 'macros', 'metadata', 'programs', 'response', and 'Users'. The 'metadata' folder is highlighted.

Veeva

SAS



The screenshot shows the SAS Life Science Analytics Framework interface. The left sidebar contains a navigation menu with 'Dashboard', 'Messaging', 'CONTENT MANAGEMENT', 'Repository', 'Workspace', 'Checked-out Files', 'File Comparison', 'Schedules', 'Sessions', 'WORKFLOW', 'Process Flow Definitions', 'Tasks', 'CLINICAL MANAGEMENT', and 'Data Standards'. The 'Sessions' tab is selected. The main content area displays a table titled 'SAS Session: 4' with columns: #, Id, and name. The table lists three sessions: 1 (AVEG 111), 2 (ETB 050), and 3 (AVEG 027).

#	Id	name
1	OST0000000002001	AVEG 111
2	OST0000000002002	ETB 050
3	OST0000000002003	AVEG 027

Process of creating CDR integration with Veeva Vault

- Things we are going to set-up in CDR
 - Credentials*.cfg
 - Setup.sas
 - Veeva_ctms.sas
 - Veeva_ctms.job

The screenshot displays the SAS Life Science Analytics Framework - Repository interface. The left sidebar contains navigation links: Dashboard, Messaging, CONTENT MANAGEMENT, Repository (selected), Workspace, Checked-out Files, File Comparison, Schedules, Sessions, WORKFLOW, Process Flow Definitions, Process Flows, Tasks, CLINICAL MANAGEMENT, Data Standards, and Controlled Terminology. The main content area shows the file structure of the selected 'Repository' folder. The 'Veeva' folder is expanded, revealing subfolders like 'documents', 'lllm', 'lua', 'macros', 'metadata', 'programs', and 'response'. The 'programs' folder is selected, displaying a list of files in a table format. The table has columns for checkboxes, file type icons, file names, sizes, modified by, and modified dates. The files listed are 'credentials_template.cfg' (264 bytes), 'setup.sas' (1.74 KB), 'veeva_ctms.job' (1.18 KB), and 'veeva_ctms.sas' (5.76 KB).

		Name	Size	Modified By	Date Modified
☐		credentials_template.cfg	264 bytes	Pritesh Desai	Apr 18, 2022, 9:12 A...
☐		setup.sas	1.74 KB	Lex Jansen	Aug 12, 2021, 12:30 ...
☐		veeva_ctms.job	1.18 KB	Lex Jansen	Aug 11, 2021, 2:28 P...
☐		veeva_ctms.sas	5.76 KB	Lex Jansen	Aug 12, 2021, 2:14 P...

Process of creating CDR integration with Veeva Vault

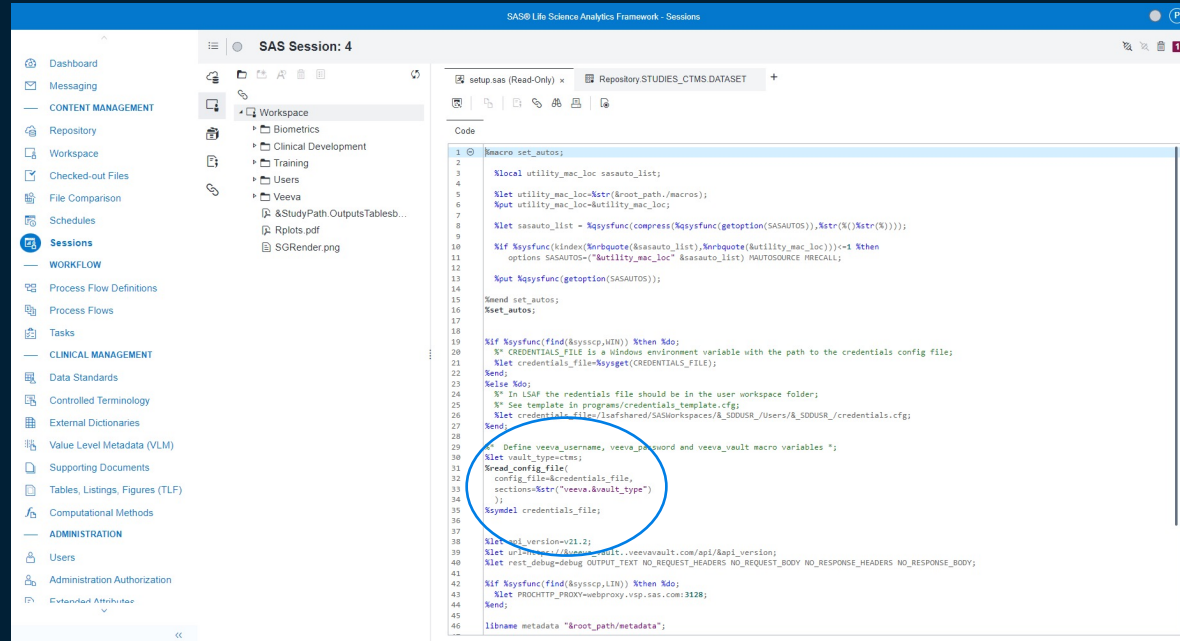
1. Create Credentials*.cfg file with credentials to Veeva

```
credentials_template.cfg - Notepad
File Edit Format View Help

[veeva.cdms]
veeva_username=username@vvtechpartner-sas.com
veeva_password=xxxxxxx
veeva_vault=vvtechpartner-sas-cdms01

[veeva.ctms]
veeva_username=username@vvtechpartner-sas.com
veeva_password=xxxxxxx
veeva_vault=vvtechpartner-sas-ctms01
```

2. Create setup.sas file in LSAF to make connection with Veeva via SAS Session



```
SAS Life Science Analytics Framework - Sessions
setup.sas (Read-Only) x Repository\STUDIES_CTMS_DATASET
Code
1 macro set_autos;
2
3   %local utility_mac_loc sasauto_list;
4
5   %let utility_mac_loc=%str(&root_path./macros);
6   %put utility_mac_loc=utility_mac_loc;
7
8   %let sasauto_list = %sysfunc(compress(%sysfunc(getoption(SASAUTOS)),%str(%N)%str(%N)));
9
10  %if %sysfunc(kindex(%str(%sasauto_list),%str(%N)%str(%N)))<1 %then
11    options SASAUTOS=(%str(%N)%str(%N) %str(%N) %str(%N));
12
13  %put %sysfunc(getoption(SASAUTOS));
14
15 %mend set_autos;
16 %set_autos;
17
18
19 %if %sysfunc(find(%sysfunc(%N))) %then %do;
20   %* CREDENTIALS_FILE is a Windows environment variable with the path to the credentials config file;
21   %let credentials_file=%sysfunc(%N);
22 %end;
23
24 %* In LSAF the credentials file should be in the user workspace folder;
25 %* See template in programs/credentials_template.cfg;
26 %let credentials_file=%str(&root_path./Users/&SODUSER/&SODUSER/credentials.cfg);
27 %end;
28
29 %define veeva_username, veeva_password and veeva_vault macro variables ";
30 %let vault_type=ctms;
31 %read_config_file
32   config_file=credentials_file,
33   sections=%str("veeva.&vault_type");
34 %;
35 %symbol credentials_file;
36
37
38 %let _version=21.2;
39 %let url=https://&veeva_vault.veevavault.com/api/&api_version;
40 %let rest_debug=debug OUTPUT_TEXT NO_REQUEST_HEADERS NO_REQUEST_BODY NO_RESPONSE_HEADERS NO_RESPONSE_BODY;
41
42 %if %sysfunc(find(%sysfunc(%N))) %then %do;
43   %let PROXY_HTTP_PROXY=webproxy.vsp.sas.com:3128;
44 %end;
45
46 %libname metadata "&root_path/metadata";
```

Process of creating CDR integration with Veeva Vault

3. Create Veeva_CTMS.sas file

```
SAS Session: 4
setup.sas (Read-Only)  veeva_ctms.sas (Read-Only) x +

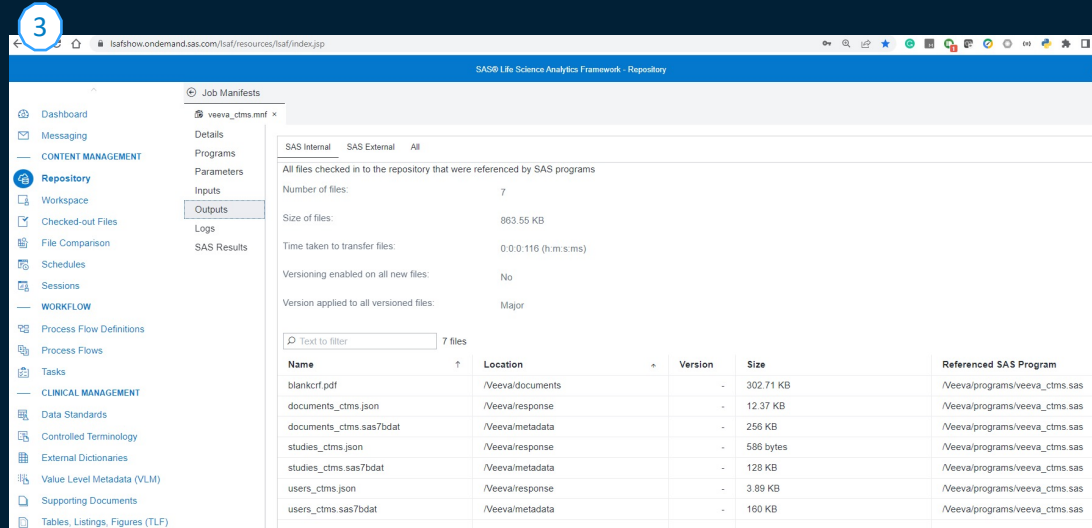
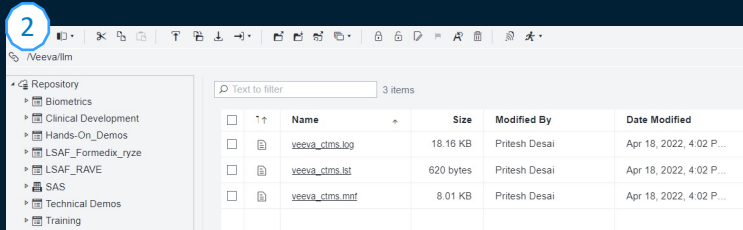
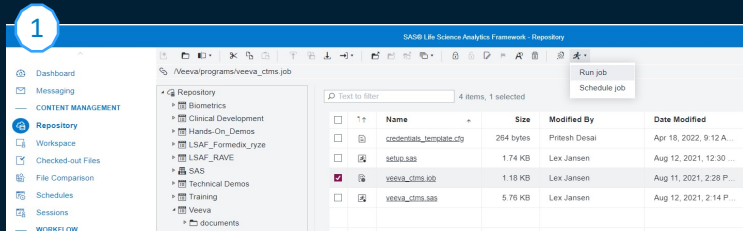
Code
1 %global root_path;
2
3 %* Change this folder path if needed;
4 %if %sysfunc(find(%syscp,WIN)) %then %do;
5   %let root_path=/_Projects/Veeva_sas;
6 %end;
7 %else %do;
8   %let root_path = &_SASUS_&_SASFILELOCATION_/_;
9 %end;
10 %put &root_path;
11
12 %* include setup file;
13 %include "&root_path./programs/setup.sas";
14
15 %*-----
16 %*** Get token
17 %*-----
18
19 filename input TEMP;
20 filename headers TEMP;
21 filename response TEMP;
22
23 @ data_null;
24   file input recfm=f lrecl=1;
25   put "username=&veeva_username.&nrstr(&password=&veeva_password";
26 run;
27
28 %global token;
29 %let token;
30 %let endpoint=auth;
31
32 proc http;
33   method="POST";
34   url="&url/&endpoint";
35   in=input;
36   headerout=headers;
37   out=response;
38   HEADEROUT_OVERWRITE;
39   &rest_debug;
40 run;
41
42 %put %sysfunc(jsonpp(response, log));
43
44 %procthttp_check_return(200, %str(Get token));
45 %if (%SYS_PROCTHTTP_STATUS_CODE eq 200) %then
```

```
46
47   %do;
48     local response_json = jsondecode(fileutils.read("response"));
49     if response_json['responseStatus'] == 'SUCCESS'
50     then
51       sas.symput('token', response_json['sessionId'])
52     else
53       sas.print("%>1%.response_json['errors'][1]['type'], response_json['errors'][1]['message'
54     end
55   ;
56   endsub;
57 run;
58
59 %let veeva_username veeva_password;
60
61
62
63 filename input clear;
64 filename headers clear;
65 filename response clear;
66
67 %*-----
68 %*** Get users
69 %*-----
70
71 filename headers TEMP;
72 filename response "&root_path/response/users_&vault_type..json";
73
74 %let endpoint=query?q=SELECT id, user_name_v, user_first_name_v, user_last_name_v, vault_id_v
75 %let endpoint=metadata/objects/users;
76 %let dataset=metadata.users_&vault_type;
77
78
79 proc http;
80   method="GET";
81   url="&url/&endpoint";
82   headerout=headers;
83   out=response;
84   HEADEROUT_OVERWRITE;
85   headers "Authorization"="&token" "Accept"="application/json" "X-VaultAPI-DescribeQuery"="true";
86   &rest_debug;
87 run;
```

```
102 filename headers clear;
103 filename response clear;
104
105 %*-----
106 %*** Get studies
107 %*-----
108
109 filename headers TEMP;
110 filename response "&root_path/response/studies_&vault_type..json";
111
112 %let endpoint=query?q=SELECT id, name_v FROM study__v;
113 %let dataset=metadata.studies_&vault_type;
114
115 proc http;
116   method="GET";
117   url="&url/&endpoint";
118   headerout=headers;
119   out=response;
120   HEADEROUT_OVERWRITE;
121   headers "Authorization"="&token" "Accept"="application/json" "X-VaultAPI-DescribeQuery"="true";
122   &rest_debug;
123 run;
124
125 %put %sysfunc(jsonpp(response, log));
126
127 %procthttp_check_return(200, %str(Get Studies));
128 %if (%SYS_PROCTHTTP_STATUS_CODE eq 200) %then
129   %do;
130     proc lua;
131       submit;
132         veeva.get_metadata("STUDIES", 'data');
133       endsubmit;
134     run;
135
136 %end;
137
138 filename headers clear;
139 filename response clear;
140
```

Process of creating CDR integration with Veeva Vault

4. Create Veeva_CTMS.job manifest files. Job manifest files gives complete traceability of SAS pgm, log, lst and outputs created by sas execution.



Process of creating CDR integration with Veeva Vault

Final output

3

Name	Location
blankcrf.pdf	/Veeva/documents
documents_ctms.json	/Veeva/response
documents_ctms.sas7bdat	/Veeva/metadata
studies_ctms.json	/Veeva/response
studies_ctms.sas7bdat	/Veeva/metadata
users_ctms.json	/Veeva/response
users_ctms.sas7bdat	/Veeva/metadata

3a

☐	1 ↑	Name	Size	Modified By	Date Modified	Sig...	Repository...	Workspace...
☐		blankcrf.pdf	302.71 KB	Pritesh Desai	Apr 18, 2022, 4:02 P...		-	

3b

3 / 22 | 100% + |

CDISC Study CDISC01			
Enrollment Form			

Enroll the subject by entering the 3-digit Site # and the 5-digit Subject ID#

Site #

SITEID

Subject ID#

SUBJID

SC=Subject Characteristics

Subject Initials

SCORRES when SCTESTCD = SUBJINIT

Form Design Note:
Subject ID is mapped forward to the Subject Demographic Data eCRF.

Process of creating CDR integration with Veeva Vault

- Veeva Vault Access
- PROC HTTP requests from SAS
- Reading JSON in SAS
- Proc Lua in SAS
- Make dynamic prompts and jobs in CDR

References and Suggested Reading

- Lex Jansen: [Extracting Data Standards Metadata and Controlled Terminology from the CDISC Library using SAS® with PROC LUA](#)
- Lex Jansen: [Parsing JSON Files in SAS® using PROC LUA](#)
- Lou Galway: [Your Data Is in Amazon Web Services \(AWS\): How Do You Access It with SAS®?](#)
- Delal Makansi, Sandeep Juneja, Ben Bocchicchio: [Achieving Success of Migrating Enterprise Applications to Cloud](#)

Special thanks to Lex Jansen for the core contribution!

Questions

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