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# SDD APIs: Extending the Capabilities of SAS Drug Development

SDD Briefing  
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Copenhagen, Denmark

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Consultant & Owner

# Agenda

- **Introduction:**  
Java APIs vs Macro APIs
- **Remote API Case-study:**  
Developing an integrated platform
- **Macro API Case-study:**  
Optimizing your environment
- **Conclusions**



# SDD

## User Management

The screenshot shows the SAS Drug Development interface with several annotations in red circles and lines pointing to specific features:

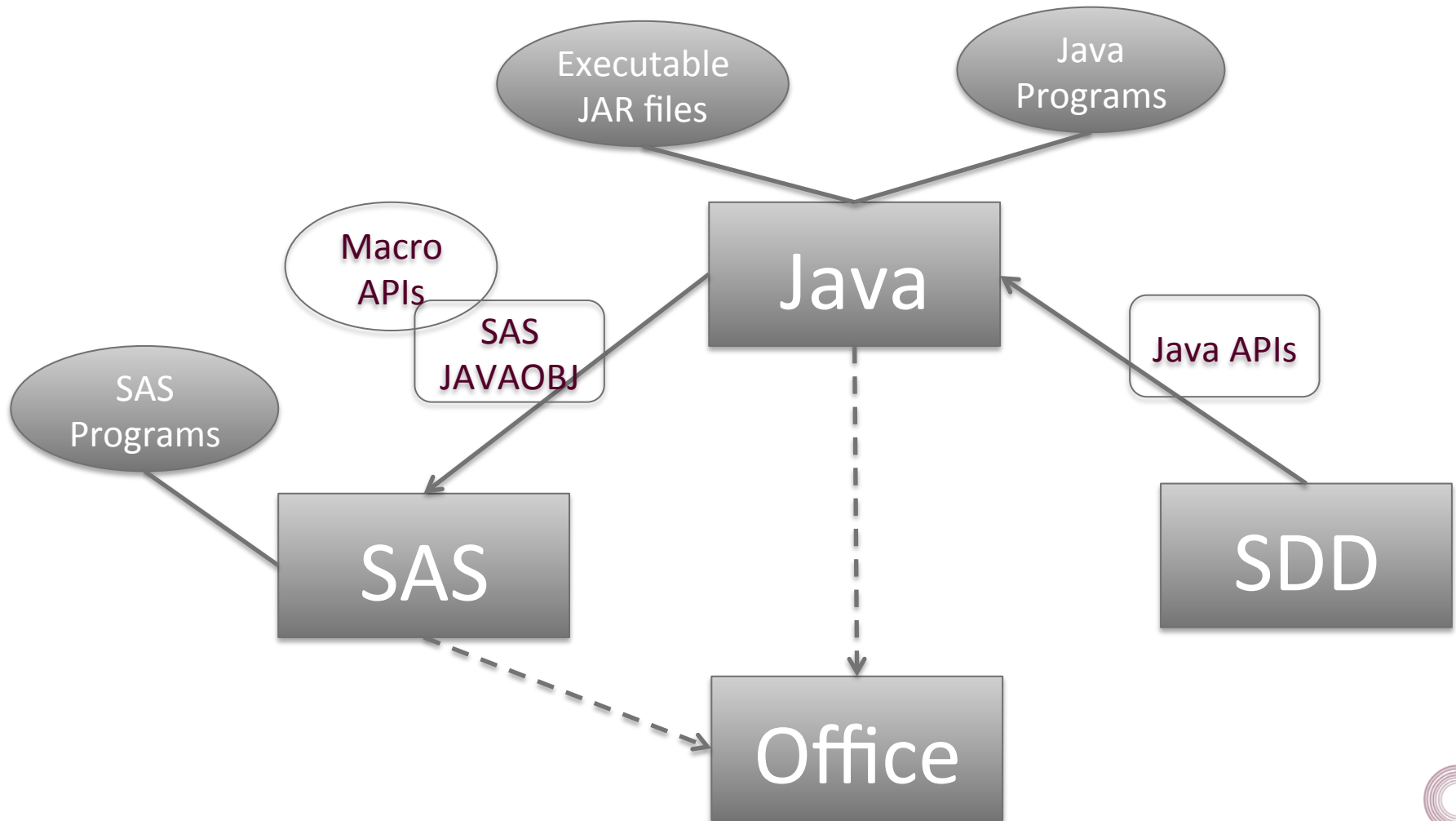
- Administration**: Points to the 'Administration' menu item in the top navigation bar.
- Repository / Workspace**: Points to the 'Repository' and 'Workspace' tabs in the breadcrumb navigation.
- Run program/job**: Points to the 'Run' icon (a person) in the toolbar.
- Properties / Permissions**: Points to the 'Properties' and 'Permissions' sections in the right-hand sidebar.
- Upload / Download**: Points to the 'Upload' and 'Download' icons in the toolbar.
- Check-in/out**: Points to the 'Check-in' and 'Check-out' icons in the toolbar.
- Versioning**: Points to the 'Versioning' icon in the toolbar.

The main content area displays a file list table with the following columns: Name, Size, Modified By, and Date Modified. The table lists various files such as adae.sas7bdat, adanti.sas7bdat, adbl.sas7bdat, etc.

Name	Size	Modified By	Date Modified
adae.sas7bdat	262144	Jean-Marc Ferran	Aug 22, 2014 11:27 A...
adanti.sas7bdat	2621440	Jean-Marc Ferran	Sep 08, 2014 09:55 P...
adbl.sas7bdat	786432	Jean-Marc Ferran	Aug 22, 2014 11:27 A...
adcm.sas7bdat	262144	Jean-Marc Ferran	Aug 22, 2014 11:27 A...
adds.sas7bdat	294912	Jean-Marc Ferran	Aug 22, 2014 11:27 A...
ademb1.sas7bdat	1835008	Jean-Marc Ferran	Aug 22, 2014 11:27 A...
ademb2.sas7bdat	2097152	Jean-Marc Ferran	Aug 22, 2014 11:27 A...
adex.sas7bdat	393216	Jean-Marc Ferran	Aug 22, 2014 11:27 A...
adimpl.sas7bdat	524288	Jean-Marc Ferran	Aug 22, 2014 11:27 A...
adinj.sas7bdat	2359296	Jean-Marc Ferran	Aug 22, 2014 11:27 A...
admh.sas7bdat	262144	Jean-Marc Ferran	Aug 22, 2014 11:27 A...
adohss.sas7bdat	262144	Jean-Marc Ferran	Aug 22, 2014 11:27 A...
adpgloss.sas7bdat	655360	Jean-Marc Ferran	Aug 22, 2014 11:27 A...
adpreg.sas7bdat	786432	Jean-Marc Ferran	Aug 22, 2014 11:27 A...
adsl.sas7bdat	163840	Jean-Marc Ferran	Aug 22, 2014 11:27 A...
adsl2.sas7bdat	262144	Jean-Marc Ferran	Aug 22, 2014 11:27 A...
adsv.sas7bdat	573440	Jean-Marc Ferran	Aug 22, 2014 11:27 A...
adtvu.sas7bdat	1048576	Jean-Marc Ferran	Aug 22, 2014 11:27 A...
advs.sas7bdat	1179648	Jean-Marc Ferran	Aug 22, 2014 11:27 A...

The right-hand sidebar shows the 'Properties' and 'Permissions' section. The 'Permissions' section is currently selected, showing the 'Current' tab. The 'Owner' is listed as Jean-Marc Ferran. The 'Users or Groups' section is also visible, showing the 'Owner' and 'Members' (Analysis\_JM\_Programmer).

# Java APIs vs. Macro APIs



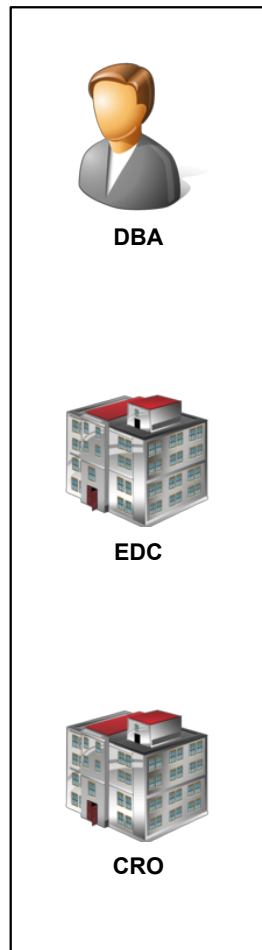
# Java APIs 1.7.1 – SDD 4.4 & 4.5

User Management	UserService, GlobalPrivilegeAssignmentService
Context Management	OrganizationService, ProjectService, AnalysisService
Membership Management	MembershipService
Group Management	GroupService
Role Management	RoleDefinitionService, PrivilegeService, RoleAssignmentService
File Management	RepositoryResourceService, BatchRepositoryResourceService, WorkspaceResourceService, BatchWorkspaceResourceService, AclService, SignatureService
Job Management	JobService, JobExecutionService
Schedule Management	ScheduleService
Subscription Management	SubscriptionService
Work Items	WorkItemService
Recycle Bin	RecycleBinService
Audit	AuditService
Application Management	ApplicationInformationService, TypeService

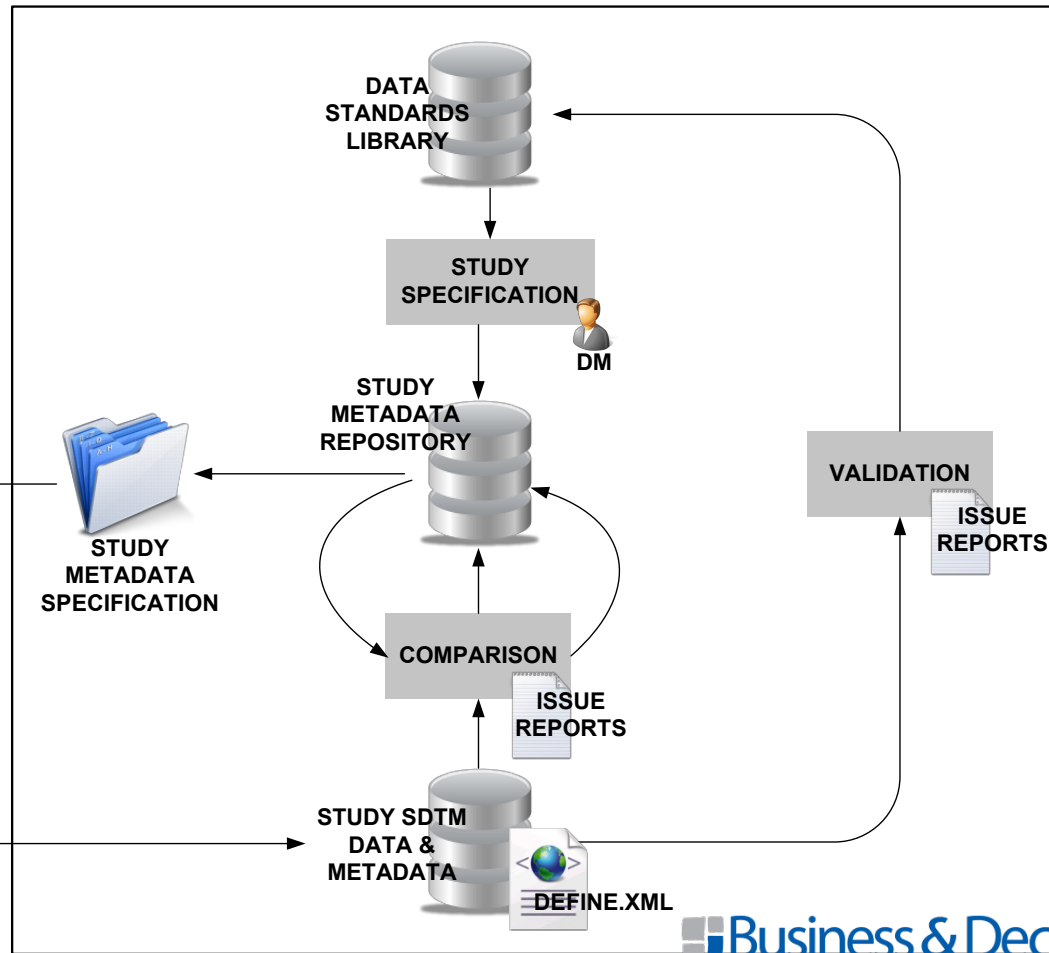


# Case study: Developing an integrated platform with the Java APIs

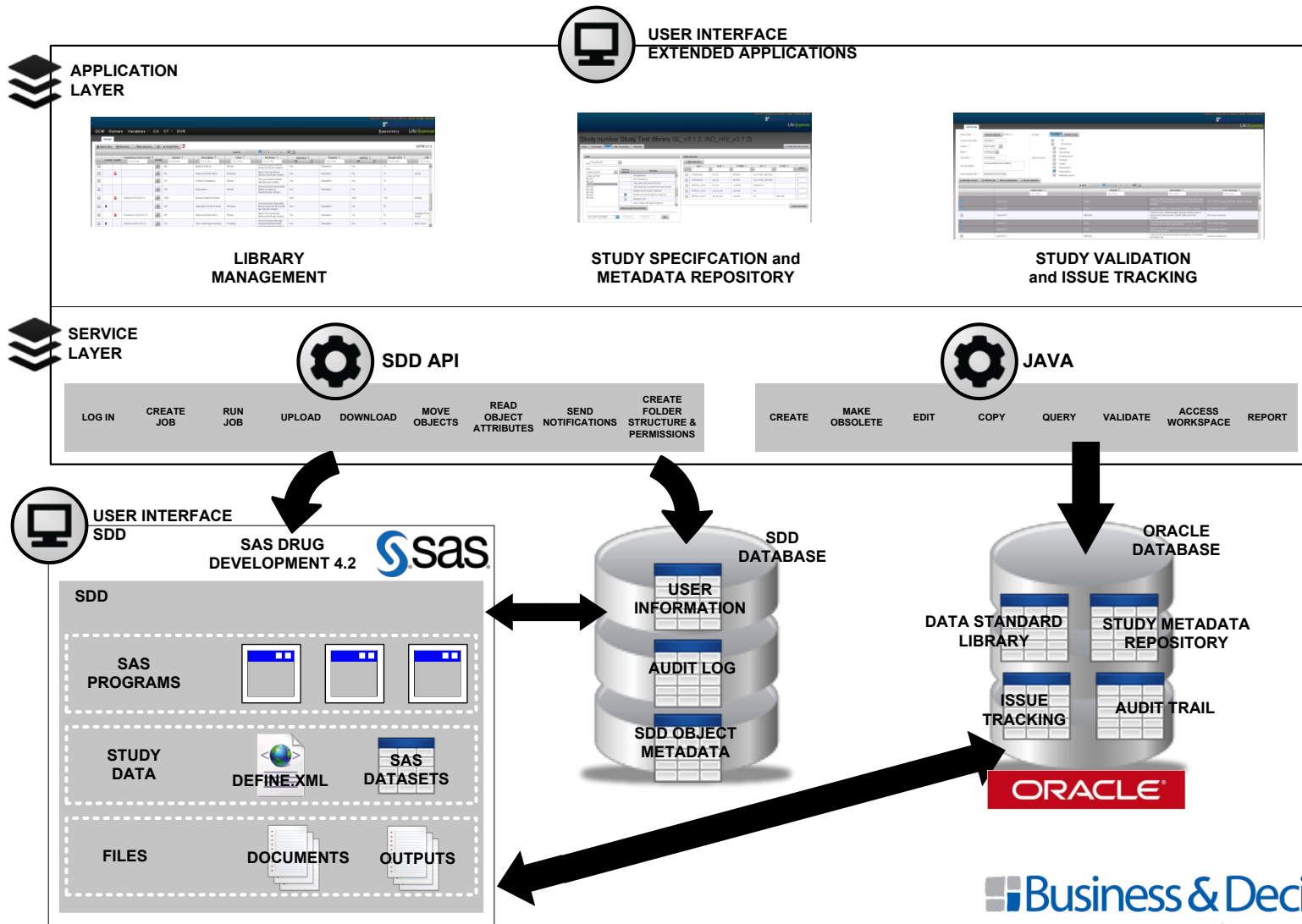
## DATA COLLECTION AREA



## DATA MANAGEMENT AREA

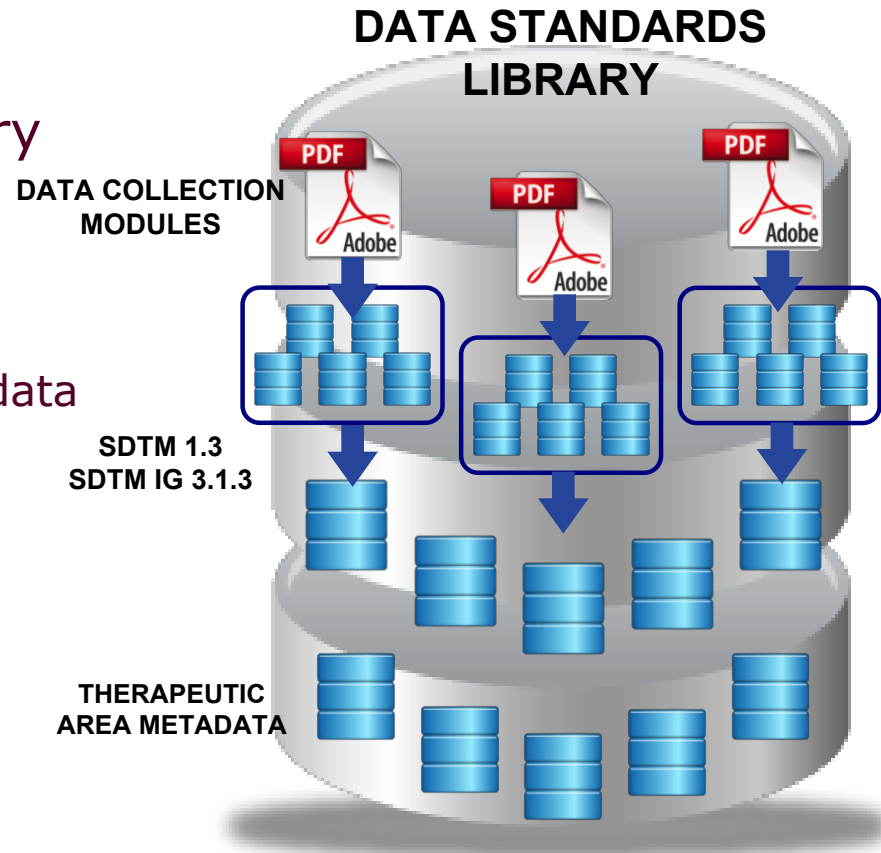


# Architecture and Solution Overview

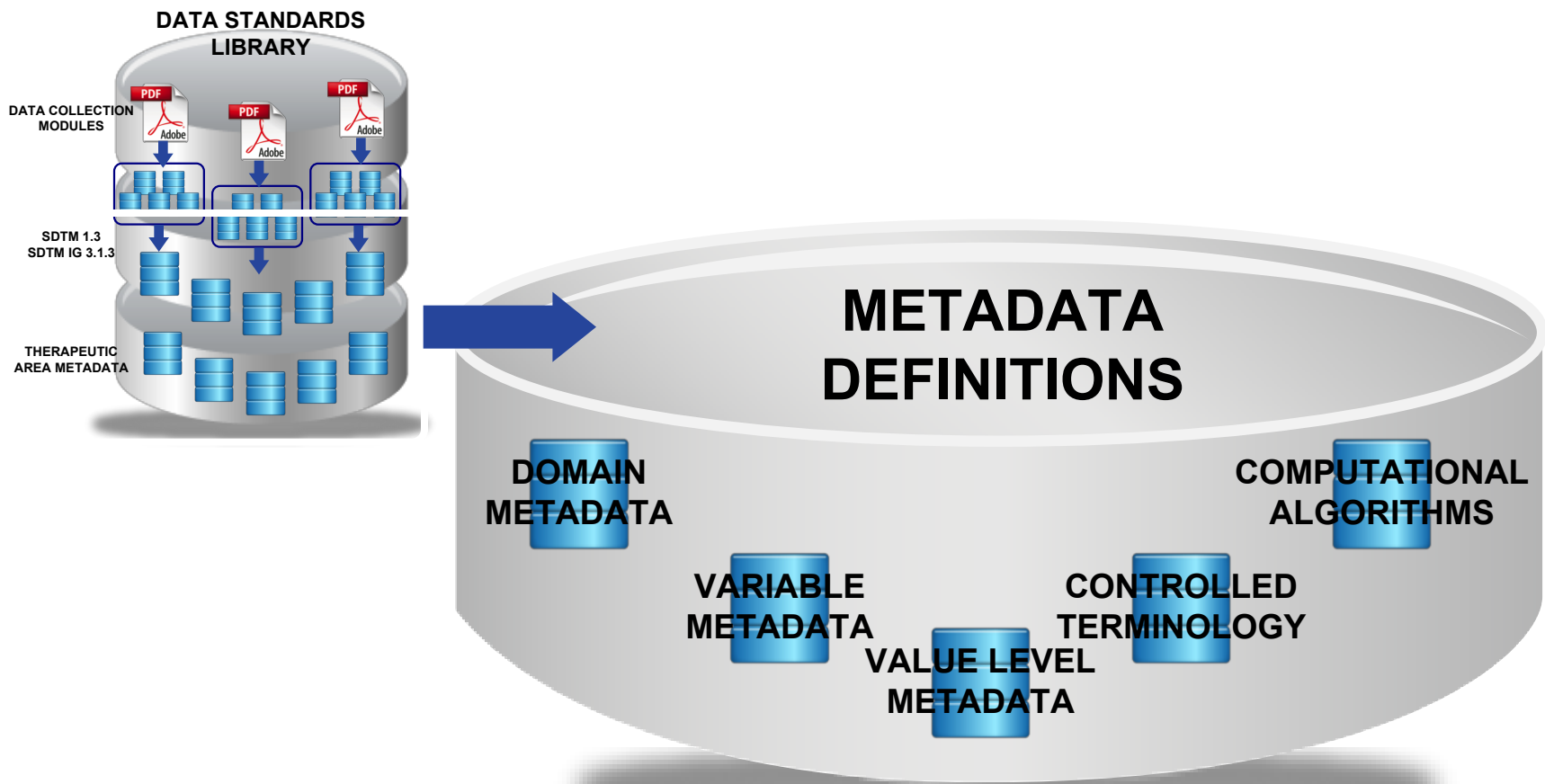


# Data Standards Library

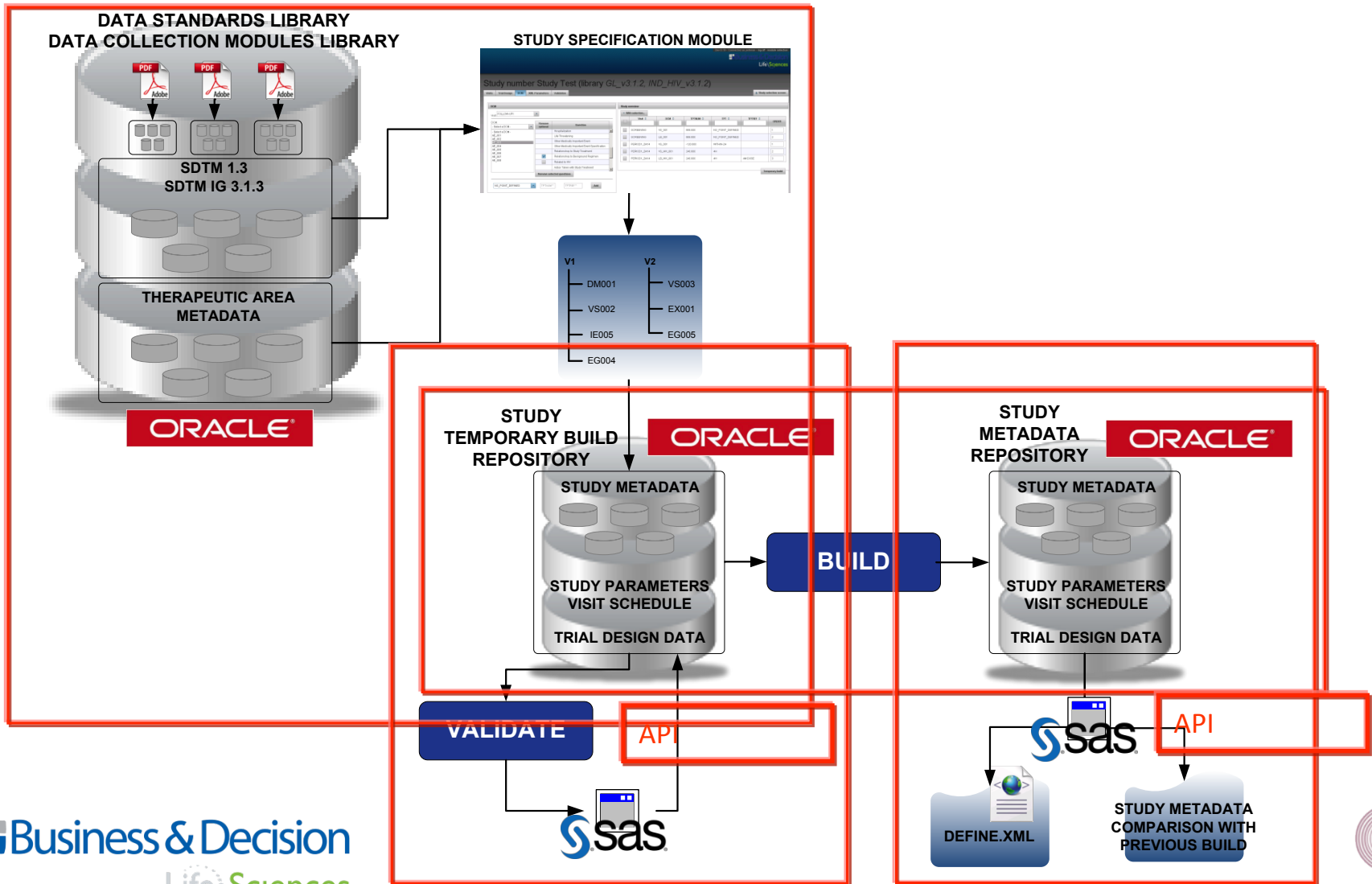
- The Data Standards Library contains :
  - Data Collection Modules:
    - using CDASH metadata
    - with clustered SDTM metadata
    - annotated for CDASH
    - annotated for SDTM
  - Metadata Definitions :
    - SDTM Standards
    - Therapeutic



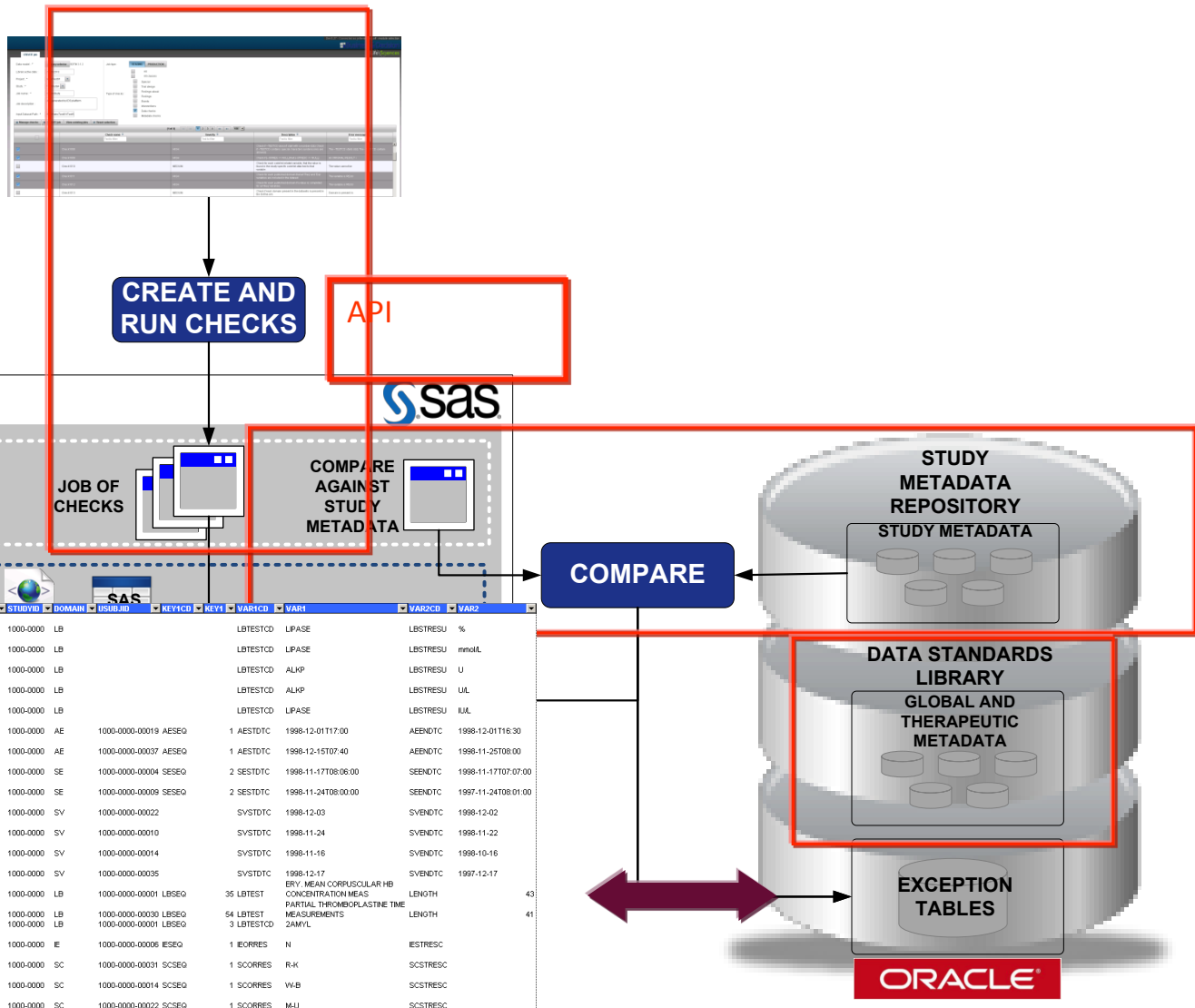
# Metadata Definitions



# Study Metadata Build Process

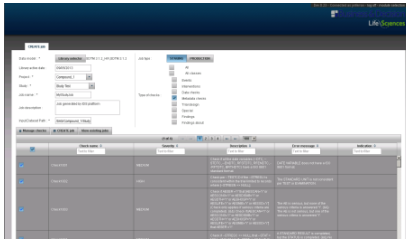
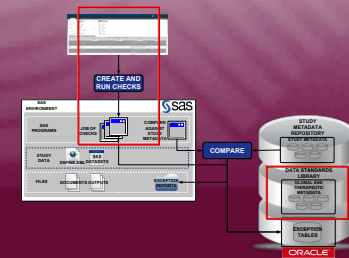
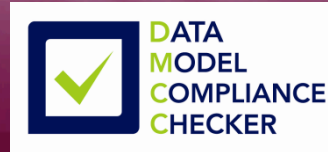


# Study Validation Process



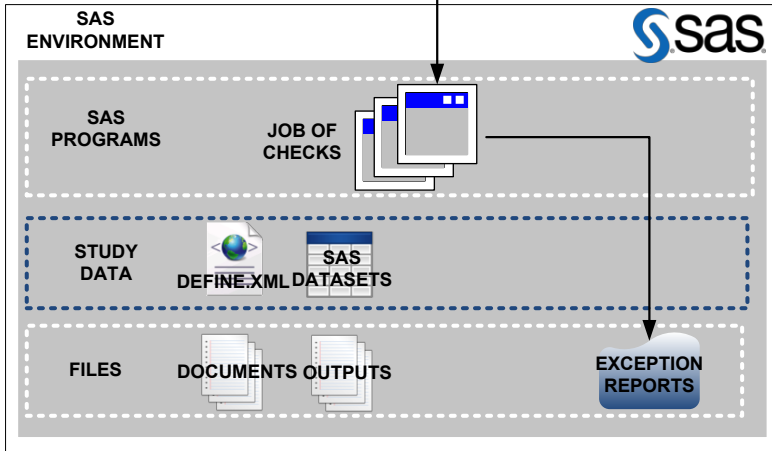
# Study validation

## SAS/SDD job of checks



API

CREATE AND RUN CHECKS



SAS® Drug Development

View Tools Administration Help

Dashboard Repository Workspace MyStudyJob

Variable Name	Label	Type	Default Value
PROJECT_ID	Project Identifier	Character	Compound_1
JOB_ID	Job Identifier	Character	X
VERSION_DATE	Version date of controlled terminology	Character	2011-12-09
LIST_OF_DOMAINS	Domains to check	Character	ALL
TARGET_DATA_PATH	Path of the data	Character	/SAS/TCCompound_1/Study Test/Files/SDTM_datasets/
DM_VERSION	Version of data model	Character	SDTM 3.1.2
STUDY_ID	Study identifier	Character	Study Test
METADATA_PATH	Path of the define.xml	Character	/SAS/TCCompound_1/Study Test/Files/Metadata/
EXCEPTION_PATH	Path for the exception report	Character	/SAS/TCCompound_1/Study Test/Files/Reports

SAS® Drug Development

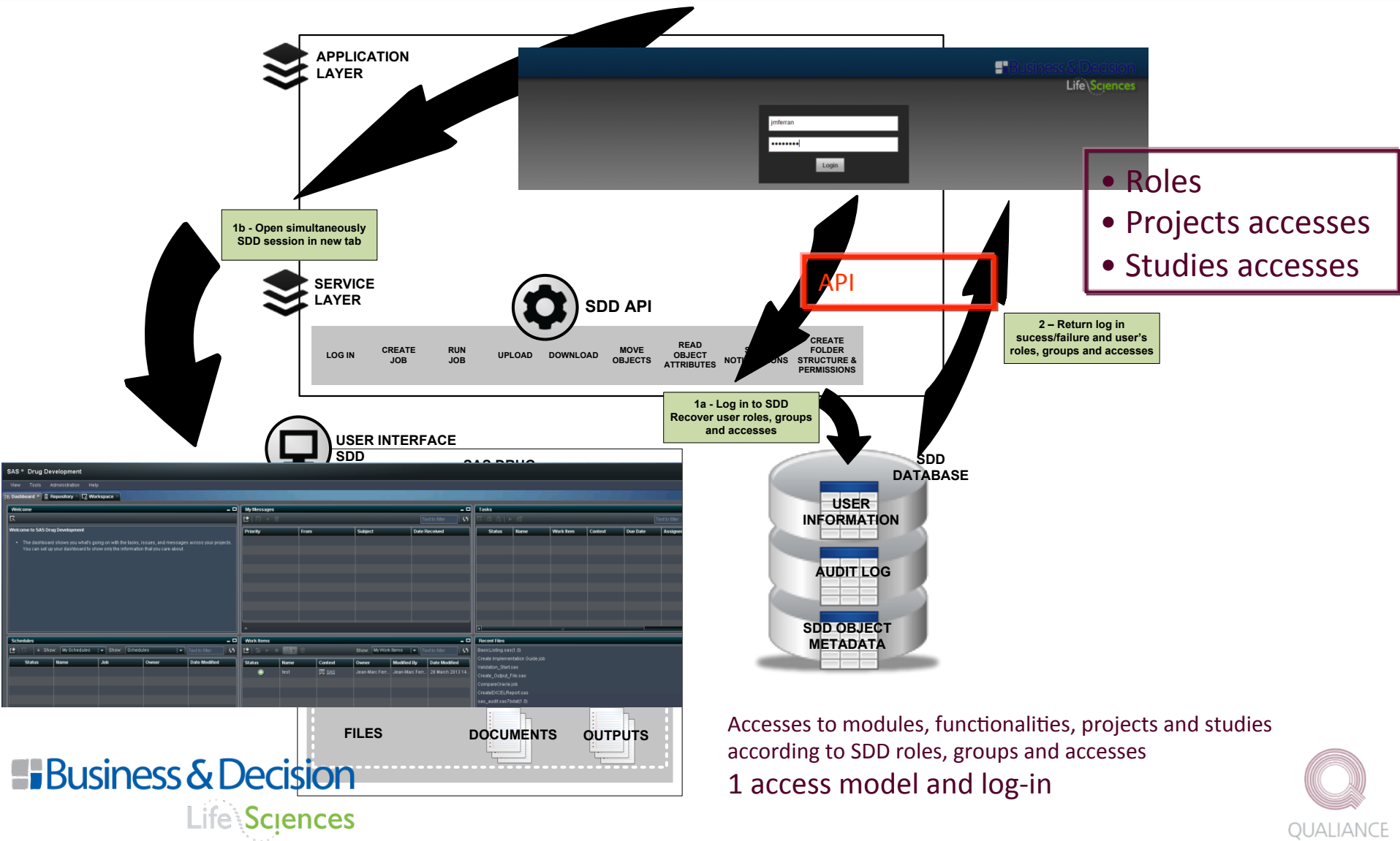
View Tools Administration Help

Dashboard Repository Workspace MyStudyJob

Name	Location
RUN_JOB.sas	/SAS/Files/Global Files/Programs/Study Validation/Programs/
CHECK1002.sas	/SAS/Files/Global Files/Programs/Study Validation/Programs/Checks/
CHECK1003.sas	/SAS/Files/Global Files/Programs/Study Validation/Programs/Checks/
CHECK1004.sas	/SAS/Files/Global Files/Programs/Study Validation/Programs/Checks/
CHECK1005.sas	/SAS/Files/Global Files/Programs/Study Validation/Programs/Checks/
CHECK1006.sas	/SAS/Files/Global Files/Programs/Study Validation/Programs/Checks/
CHECK1007.sas	/SAS/Files/Global Files/Programs/Study Validation/Programs/Checks/
CHECK1008.sas	/SAS/Files/Global Files/Programs/Study Validation/Programs/Checks/
CHECK1009.sas	/SAS/Files/Global Files/Programs/Study Validation/Programs/Checks/
CHECK1011.sas	/SAS/Files/Global Files/Programs/Study Validation/Programs/Checks/

# Integration features (1)

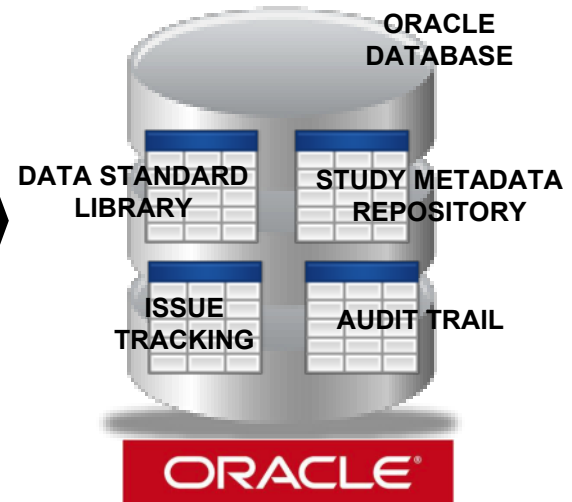
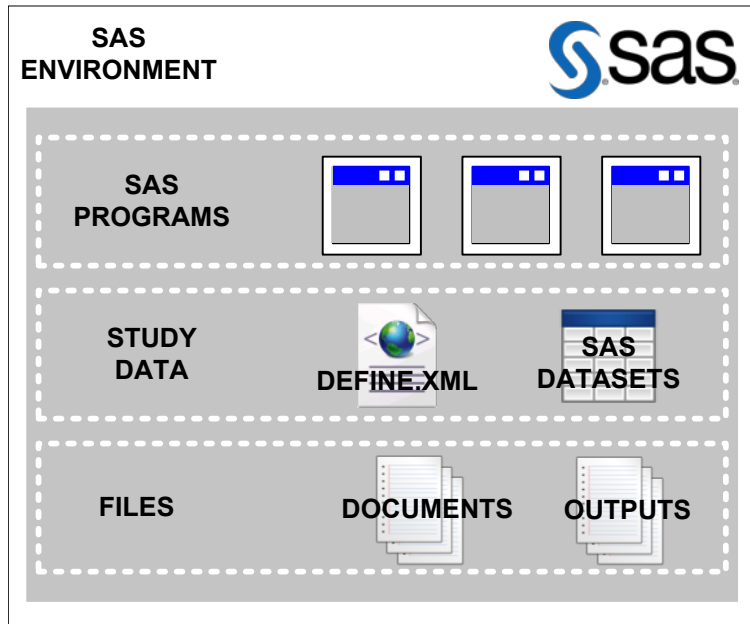
## User access and security model



Accesses to modules, functionalities, projects and studies according to SDD roles, groups and accesses  
1 access model and log-in

# Integration features (2)

## Reporting capability and access to Oracle

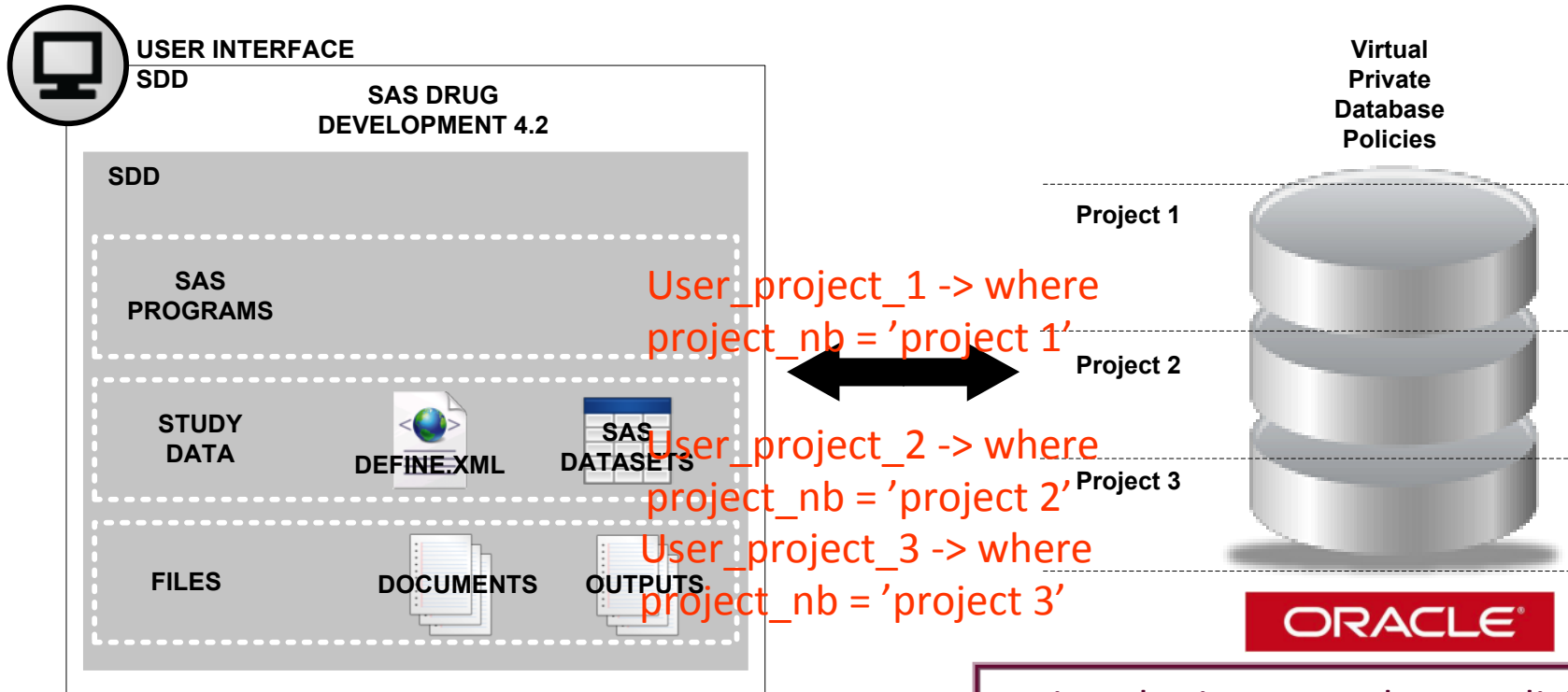


Data Standards Library Comparison  
Implementation Guides  
Completion Guides  
Trial summary-based search reports  
Metrics reports

Study metadata comparison across study versions  
Study metadata comparison across projects  
Define.xml  
Export of trial design datasets  
Study metadata-based search reports

# Integration features (2)

## Project/study-level access to Oracle tables



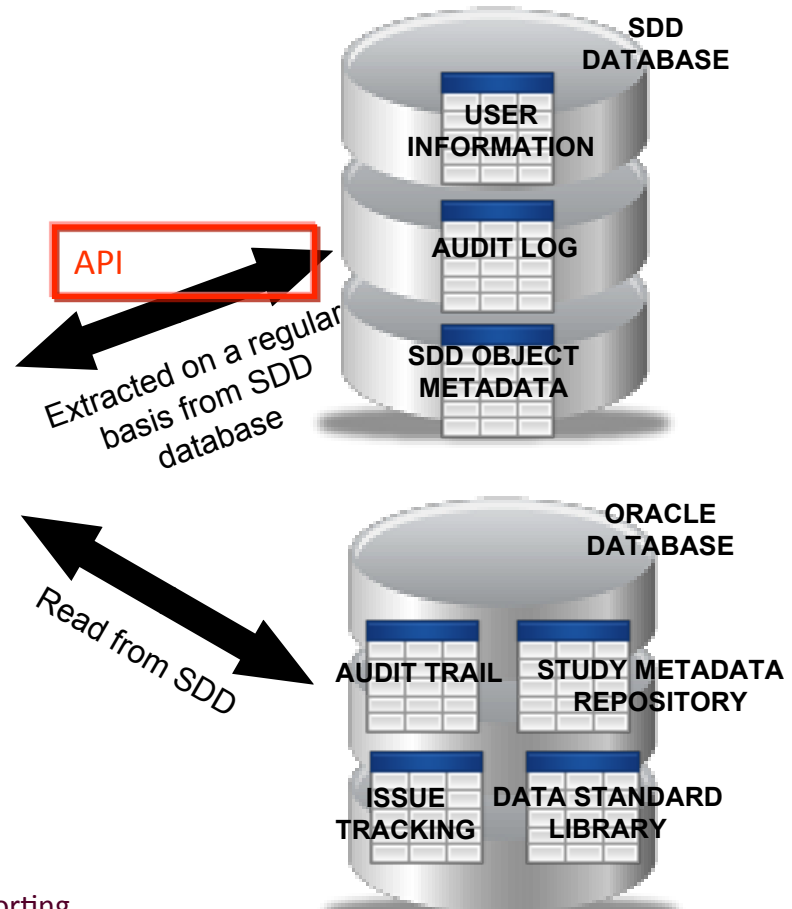
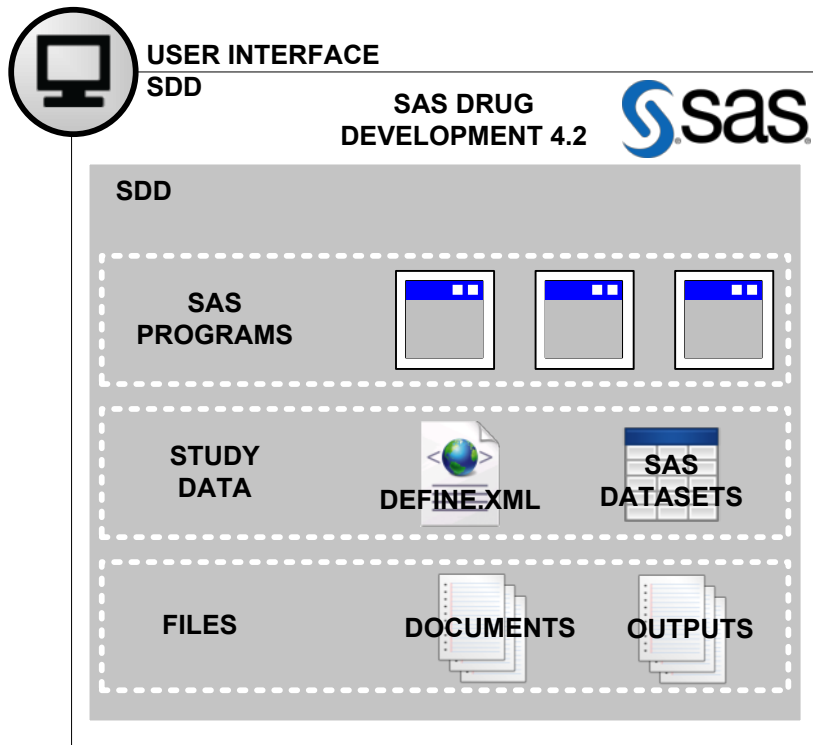
Access to study metadata can be restricted by projects at row level access using virtual private databases

Ref: [http://docs.oracle.com/cd/B28359\\_01/network.111/b28531/vpd.htm](http://docs.oracle.com/cd/B28359_01/network.111/b28531/vpd.htm)

- Virtual Private Database Policies attached to each study metadata table
- Dynamic where clausuring automatically applied according to Oracle user id
  - Ex: Where project\_nb=project 1

# Integration features (3)

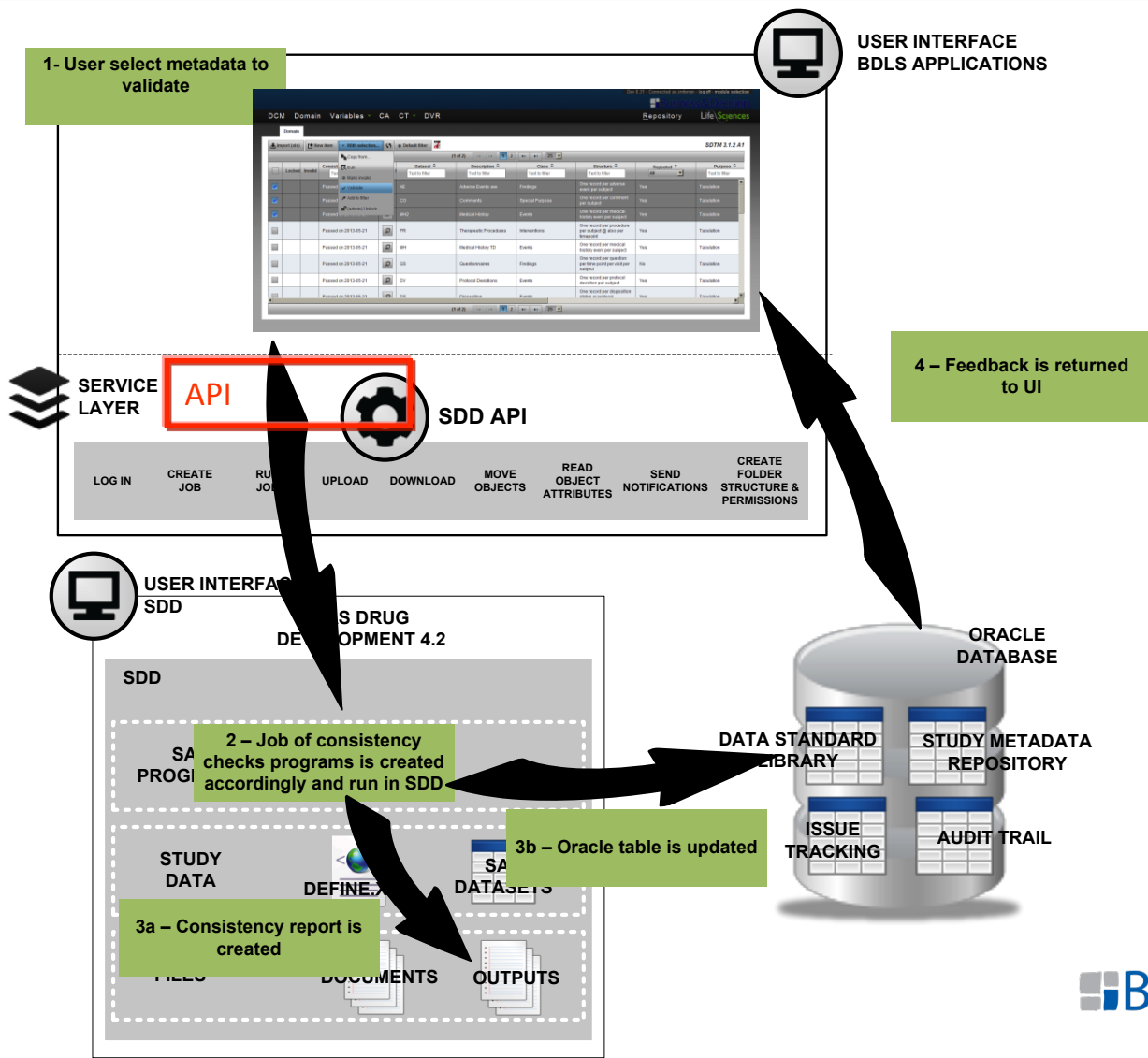
## Audit trail



Audit trails in same structure is easily integrated for reporting

# Integration features (4)

## Library/Study Metadata validation flow



# Integrated platform benefits

- No redundancy in information
  - **User information**, privileges and project/study accesses located and managed **in one place**
  - **No duplication of metadata**, continuous access to metadata repository in Oracle
- Java, SAS, Oracle provide each great benefits
  - **Java** technologies:
    - User friendly web interfaces
    - Services for integration
  - **SAS**:
    - **Analytical** power
    - **Well-known** by users
    - Code can be updated **outside new release**
  - **Oracle**:
    - **Row-level** access and locking
    - Further **security** features

# APIs – Other Examples

## SDD Extensions (Feeds/Pulls) & CTDT extension

Home SAS Drug Development Questions / Answers Training

Sections: Pulls Options: [v]

[SDD Home](#) → [Pulls Home](#) → [Pulls List](#)

Thread: All ID Start: [ ] ID End: [ ] Full Path contains: [ ] File Name (in transfer) contains: [ ] #: 100 [View] [Clear]

Started From: [ ] Started To: [ ] Other Filter: [ ]

Pulls List: 4 record(s) of 4 total

[Back to Pulls Home](#) | [Pulls Rules](#) | [Queue Pulls Run Now](#) | [Older Runs](#)

ID	Status	# Files	Size	Started	Thread	Comments	Run Log
4	Complete	0	0	18-AUG-14 08:18:11 EDT	1	[i]	<a href="#">View</a>
3	Complete	0	0	18-AUG-14 07:32:05 EDT	1	[i]	<a href="#">View</a>
2	Complete	0	0	12-AUG-14 14:16:41 EDT	1	[i]	<a href="#">View</a>
1	Complete	1	less than 1 MB	12-AUG-14 14:15:55 EDT	1	[i]	<a href="#">View</a>
		1	less than 1 MB				

Home SAS Drug Development Questions / Answers Training

Sections: SAS Drug Development Home Options: [v] [SDD Logout/Logout](#)

**Data Refreshes**

Area	Last Refresh	Refresh
Users	14-JUL-14 13:21:11 EDT	<a href="#">Refresh</a>
Files / Storage	14-JUL-14 13:11:20 EDT	<a href="#">Refresh</a>
Structure	14-JUL-14 13:13:47 EDT	<a href="#">Refresh</a>
Audit history	14-JUL-14 13:22:59 EDT	<a href="#">Refresh</a>

**Active / Inactive SDD Users**

Status	Count	Percentage
Active	43	96%
Inactive	2	4%

**SDD User License Types**

License Type	Count	Percentage
power	19	42%
dataconuser	26	58%

**SDD User Counts**

Category	Count
Total	65
Active	63
Inactive	2
Never Logged In	0
Locked Out	1
Inactive Account	0
System Account	4
Queued for Add	0

**SDD User Logins**

User	Logins
Osamu Fujita	23850

# Macro APIs: Optimize your environment

SDD versions	Java APIs	Macro APIs	Macro APIs supported functional areas
SDD 4.4 / 4.5	1.7	1.4	Job/SAS Program Management Synchronization Information Recycle Bin Subscription Management
SDD 4.3.[1/2]	1.6	1.3	User management
SDD 4.3	1.6	1.2	Context management Membership management Group management Role management
SDD 4.2	1.5	1.1	File management
SDD 4.1	1.4	/	NA

# Macro APIs 1.4 vs. Java APIs 1.7.1

	Java 1.7.1	SAS 1.4
User Management	✓	✓
Context Management	✓	✓
Membership Management	✓	✓
Group Management	✓	✓
Role Management	✓	✓
File Management	✓	✓
Job/SAS Program Management	✓	✓ (partial)
Synchronization Information	✓	✓ (partial)
Schedule Management	✓	✗
Subscription Management	✓	✓
Work Items	✓ (partial)	✗
Recycle Bin	✓	✓
Audit	✓	✗

# Latest Macro APIs

1. **Synchronize workspace** with repository
2. Read and **manage permissions**
3. **Read** version and **eSignature information**
4. Start and **monitor job execution**
5. Retrieve all **groups a user belong to**
6. **Download/upload** from a PC SAS session



# Latest Macro APIs (1)

- **Synchronize Workspace**
  - **%SASDRUDEV\_GETCHILDREN** gets list of all objects within an folder including subfolders with their
    - Full path
    - Name
    - Type
    - Properties
  - **%SASDRUGDEV\_GETSYNCSTATUS** to gets sync status with repository
    - **\_sddSyncStatus\_ = IN\_SYNC**
    - **\_sddSyncStatus\_ = OUT\_OF\_SYNC**
  - **%SASDRUGDEV\_SYNCFILETOWORKSPACE** to sync a file
- **Application:**
  - Enable at any given time to get latest version of your study data

# Latest Macro APIs (2)

- **Manage permissions**
  - **%SASDRUGDEV\_UPDATEACLS** enables to create permissions using a SAS datasets as specifications.
  - **%SASDRUGDEV\_GETACLS** enables to get permissions dataset in the right format for a given area that can then be modified or used as template to create permissions.
- **Application:**
  - Automate folder structure and permissions in SAS
  - Alternative to point and click in SDD UI  
or Java APIs



# Latest Macro APIs (3)

- **Read versions and eSignatures info**
  - **%SASDRUGDEV\_GETVERSIONS** to get all the versions
  - **%SASDRUGDEV\_GETSIGNATURES** to get eSign info of the signed versions - not signed versions dont appear in the output
- **Application:**
  - Create reports for a given study to check that all latest versions of programs are validated before conducting final run

# Latest Macro APIs (4)

- **Start and monitor job execution in repository**
  - **%SASDRUGDEV\_SUBMITJOB** submits job and creates job id: `&_sddJobSubmissionId_`.
  - **%SASDRUGDEV\_GETSUBMISSIONSTATUS** get status based on a `&_sddJobSubmissionId_`:
    - `_sddJobSubmissionStatus_ = STARTED`
    - `_sddJobSubmissionStatus_ = RUNNING_TASKS`
    - `_sddJobSubmissionStatus_ = COMPLETED_SUCCESSFUL`
    - `_sddJobSubmissionStatus_ = COMPLETED_SASERRORS`
- **Application:**
  - Create job of jobs and implement decision nodes



# Latest Macro APIs (5)

- **Find all groups for a given user id**
  - **%SASDRUGDEV\_GETUSERGROUPS** returns all the groups a given user is member of across all contexts
- **Application:**
  - Check access of all current access of a given user



# Latest APIs (6)

- **Upload/download files from a PC SAS session**
  - *Requires to login/logout using %SASDRUGDEV\_LOGIN and %SASDRUGDEV\_LOGOUT*
  - **%SASDRUGDEV\_UPLOADANDEXPAND**
  - **%SASDRUGDEV\_DOWNLOADFILE**
  - **%SASDRUGDEV\_DOWNLOADASZIP**
- **Applications:**
  - Control data exchange from a PC SAS session without the desktop connection nor using the Java APIs



# Conclusions

- **APIs enable to:**
  - **Build** utilities
  - **Interface** with other industry applications
  - **Optimize** your processes within each SDD concept
  - **Automate** manual tasks
  - **Enhance** reporting capability
  - **Keep** your environment **scalable and up to date**

# References

- SAS® Drug Development 4 - Accessing Java API all versions client and macro download
  - <http://support.sas.com/kb/46/609.html>
- SDD ++: Extending SDD Capabilities, Sandeep Juneja, AD04 - PhUSE 2012
  - <http://www.phusewiki.org/docs/2012/PRESENTATIONS/AD/AD04.pdf>
- Developing an Integrated Platform, Getting the Best out of Several Technologies, Jean-Marc Ferran, TS06 – PhUSE 2013
  - <http://www.phusewiki.org/docs/Conf%202013%20TS%20Presentations/TS06.pdf>
- SDD API 1.7.1 / 1.4 Training Material, Sandeep Juneja

# Thanks!

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