



Orbis Clinical
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Welcome CDISC Library, Goodbye PDF Documents

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- What are APIs and REST APIs?
- What is CDISC Library?
- The strategy used in SAS to obtain Controlled Terminology (CT) info from CDISC Library:
 - (a) Create a macro that makes REST API calls to CDISC Library
 - (b) Make a call to obtain latest version date of CT package
 - (c) Using (b), make a call to get CT code for the variable of interest (CMDOSU)
 - (d) Using (b) and (c), retrieve all CT terms and their codes



[Slide 3] What are Application Programming Interfaces (APIs) and REST APIs?

- The Web is no longer for fetching HTML pages only
- The Web can also be used by software applications to obtain data
- APIs allow communication between diverse software applications
- “REST” stands for “REpresentational State Transfer”
- REST API is a particular data exchange protocol, that allows the use of HTTP verbs (e.g. GET, POST) to request data on the web, getting a response in a standard format (JSON or XML).
- The use of REST APIs has grown exponentially
- CDISC Library API is a REST API



[Slide 4] What is CDISC Library?

- A huge metadata repository of CDISC standards
- Accessible via two interfaces:
 [Data Standards Browser](#) and [CDISC Library API](#)
- The two interfaces are based on linked-data and REST API



[Slide 5] Macro for Making a REST API call

```
7 %let domain=CM;
8 %let variable=CMDOSU;
9 %let SDTMversion=3-2;
10 %let API_key=%str(abcde12345fghij67890klmnop12345qrstuvwxyz);
11
12
13 %macro CallCDISCLibrary(endpoint=);
14 filename response TEMP;
15 proc http
16     url "&endpoint" out=response;
17     headers "API-Key" "&API_key" "Accept"="application/json";
18 run;
19 %mend CallCDISCLibrary;
```

[Slide 6] Endpoint for obtaining the Latest CT Package Date

```
%macro GetLatestSDTMCTpackageDate();  
  
%global LatestCodelistPackageVersion;  
  
%CallCDISCLibrary(endpoint=  
%nrstr(https://library.cdisc.org/api/mdr/ct/packages));  
---  
---  
---  
%mend GetLatestSDTMCTpackageDate;  
  
%GetLatestSDTMCTpackageDate();
```

[Slide 7] Logic for obtaining the Latest CT Package Date

```
37 INFILE RESPONSE LRECL=1000000 DLMSTR="}, " missover;  
38 *-----;  
39 INPUT @;  
40     do i = 1 by 1 until(missing(jtext));  
41     input jtext:$2000. @;  
42  
43 *-----;  
44     test=index(jtext, '/mdr/ct/packages/sdtmct')>0;  
45     if test eq 1 then do;  
46         regex1=prxparse ('#.+sdtmct\-(\d\d\d\d\-\d\d\-\d\d)\\"#, #');  
47         rx1=prxmatch(regex1, jtext);  
48         vdatex=prxposn(regex1, 1, jtext);  
49
```

[Slide 8] API Response Text and Delimiter String for Package Date Extraction

```
minology",{"href":"/mdr/ct/packages/sdtmct-2019-12-20","title":"SDTM Controlled Terminology Package 40 Effective 2019-12-20","type":"Terminology"},{"href":"/mdr/ct/packages/sdtmct-2020-03-27","title":"SDTM Controlled Terminology Package 41 Effective 2020-03-27","type":"Terminology"},{"href":"/mdr/ct/packages/sdtmct-2020-06-26","title":"SDTM Controlled Terminology Package 42 Effective 2020-06-26","type":"Terminology"},{"href":"/mdr/ct/packages/sdtmct-2020-11-06","title":"SDTM Controlled Terminology Package 43 Effective 2020-11-06","type":"Terminology"},{"href":"/mdr/ct/packages/sdtmct-2020-12-18","title":"SDTM Controlled Terminology Package 44 Effective 2020-12-18","type":"Terminology"},{"href":"/mdr/ct/packages/sdtmct-2021-03-26","title":"SDTM Controlled Terminology Package 45 Effective 2021-03-26","type":"Terminology"},{"href":"/mdr/ct/packages/sdtmct-2021-06-25","title":"SDTM Controlled Terminology Package 46 Effective 2021-06-25","type":"Terminology"},{"href":"/mdr/ct/packages/sdtmct-2014-06-25","title":"SDTM Controlled Terminology Package 47 Effective 2014-06-25","type":"Terminology"}]
```

[Slide 9] Macro for Retrieving CT code for CMDOSU

```
%macro GetCodelistNumber(Version=, Domain=, VariableName=);
%global LatestCodelistPackageVersion;
%CallCDISCLibrary(endpoint=%str(
https://library.cdisc.org/api/mdr/sdtmig/&Version./datasets/&Domain.));
DATA _NULL_;
length jtext $3000 codex: $9;
INFILE RESPONSE LRECL=1000000
DLMSTR=
|'{"codelist":[{"href":"/mdr/root/ct/sdtmct/codelists/" missover;
*-----
INPUT @;
  do i = 1 by 1 until(rx1>0);
    input jtext:$3000. @;

*-----
rx1=index(jtext,
'/mdr/sdtmig/&Version./datasets/&Domain./variables/&VariableName. ');
regex2=prxparse('#(C\d+).+#');
rx2=prxmatch(regex2, jtext);
codex2=prxposn(regex2, 1, jtext);
```



[Slide 11] Landmarks and Delimiters for Retrieving CT Code for CMDOSU

```
abulation Model Implementation Guide: Human Clinical Trials Version 3.2 (Final)","type":"Im
Guide"},"priorVersion":{"hre
f":"/mdr/sdtmig/3-1-3/datasets/CM/variables/CMDOSU",
"title":"Dose Units","type":"SDTM Dataset Variable"},"rootItem":{"href":"/mdr/ro
ot/sdtmig/datasets/CM/variables/CMDOSU","title":"Version-agnostic anchor resource for SDTMI
CM.CMDOSU","type":"Root Data E
lement"},"self":{"href":"/mdr/sdtmig/3-2/datasets/CM/variables/CMDOSU",
"title":"Dose Units","type":"SDTM Dataset Variable"}}, "core":
"Perm","description":"Units for CMDOSE, CMDOSTOT, and CMDOSTXT. Examples: ng, mg, or mg/kg.
Units","name":"CMDOSU","o
rdinal":"21","role":"Variable Qualifier","simpleDatatype":"Char"},
{"_links":{"codelist":[{"href":"/mdr/root/ct/sdtmct/codelists/C66726",
"title":"Version-agnostic anchor resource for codelist C66726","type":"Root Value Domain"}]},
{"href":"/mdr/s
```



[Slide 11] Using Package Date and CMDOSU CT code to retrieve all CT terms and their codes

```
101
102 %macro GetCodelistValues(Domain=, VariableName=);
103 %CallCDISCLibrary(endpoint=
104 %str(https://library.cdisc.org/api/mdr/ct/packages/sdtmct-
105 &latestCodelistPackageVersion./codelists/&CodelistNumber./terms));
106
107 data sasfile.CodelistTable_&var.;
108 length ctvalue ctext $200 jtext $2000;
109 INFILE RESPONSE LRECL=1000000 DLMSTR="}, " missover;
110 *-----;
111 INPUT @;
112   DO i = 1 by 1 until(missing(jtext));
113     input jtext:$2000. @; CT code for Term
114     ctext=scan(jtext,9,"/");
115     regex=prxparse('#C\d+', "title": "(.+)", "type".*#');
116     rx=prxmatch(regex, ctext);
117     if rx gt 0 then
118       do;
119         ctcode=prxposn(regex, 1, ctext);
120         ctvalue=prxposn(regex, 2, ctext);
121       end;
```



[Slide 12] API Response Text and Landmarks for CT terms and Codes

```
{
  "href": "/mdr/ct/packages/sdtmct-2021-06-25/codelists/C71620/terms",
  "title": "CDISC SDTM Unit of Measure Terminology",
  "type": "Codelist Term List",
  "terms": [
    {
      "href": "/mdr/ct/packages/sdtmct-2021-06-25/codelists/C71620/terms/C25613",
      "title": "Percentage",
      "type": "Code List Value"
    },
    {
      "href": "/mdr/ct/packages/sdtmct-2021-06-25/codelists/C71620/terms/C117963",
      "title": "Percent Inhibition",
      "type": "Code List Value"
    },
    {
      "href": "/mdr/ct/packages/sdtmct-2021-06-25/codelists/C71620/terms/C48571",
      "title": "Percent Volume per Volume",
      "type": "Code List Value"
    },
    {
      "href": "/mdr/ct/packages/sdtmct-2021-06-25/codelists/C71620/terms/C48527",
      "title": "Percent Mass per Volume",
      "type": "Code List Value"
    },
    {
      "href": "/mdr/ct/packages/sdtmct-2021-06-25/codelists/C71620/terms/C48528",
      "title": "Percent Mass per Mass",
      "type": "Code List Value"
    },
    {
      "href": "/mdr/ct/packages/sdtmct-2021-06-25/codelists/C71620/terms/C114240",
      "title": "Percent per Minute",
      "type": "Code List Value"
    },
    {
      "href": "/mdr/ct/packages/sdtmct-2021-06-25/codelists/C71620/terms/C163560",
      "title": "Percent per Second",
      "type": "Code List Value"
    }
  ]
}
```

[Slide 13]: Final Table of CT Information

	Domain	Variable	CodelistVersion	Codelist	CodelistValue	CodelistValueNumber
1	CM	CMDOSU	2021-06-25	C71620	Percentage	C25613
2	CM	CMDOSU	2021-06-25	C71620	Percent Inhibition	C117963
3	CM	CMDOSU	2021-06-25	C71620	Percent Volume per Volume	C48571
4	CM	CMDOSU	2021-06-25	C71620	Percent Mass per Volume	C48527
5	CM	CMDOSU	2021-06-25	C71620	Percent Mass per Mass	C48528
6	CM	CMDOSU	2021-06-25	C71620	Percent per Minute	C114240
7	CM	CMDOSU	2021-06-25	C71620	Percent per Second	C163560
8	CM	CMDOSU	2021-06-25	C71620	Per 100 High Powered Fields	C102695
9	CM	CMDOSU	2021-06-25	C71620	Per 100 White Blood Cells	C67219
10	CM	CMDOSU	2021-06-25	C71620	Per Thousand	C123634
11	CM	CMDOSU	2021-06-25	C71620	Per Ten Thousand	C135515
12	CM	CMDOSU	2021-06-25	C71620	Per Hundred Thousand	C135516
13	CM	CMDOSU	2021-06-25	C71620	Per 200 High Powered Fields	C122472





Thank You !

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[Slide 10] What Are Regular Expressions?

- A sequence of characters that define a search pattern, mainly for use in pattern matching with strings and extraction.
- Meta characters have special meaning:

Expression	Description
*	Item occurs zero or more times
+	Item occurs one or more times
?	Item occurs zero or one time
{A}	Item occurs A number of times
{A,B}	Item occurs between A and B times
.	Any character
.*	Matches zero or more of any character

- POSIX Character Classes are written with square brackets and keywords surrounded by colons.

For example `[:print:]` would match space, alphabetic and punctuation characters.

