

CT04 - PHUSE EU Connect 2022

Data from the Cloud and back again!

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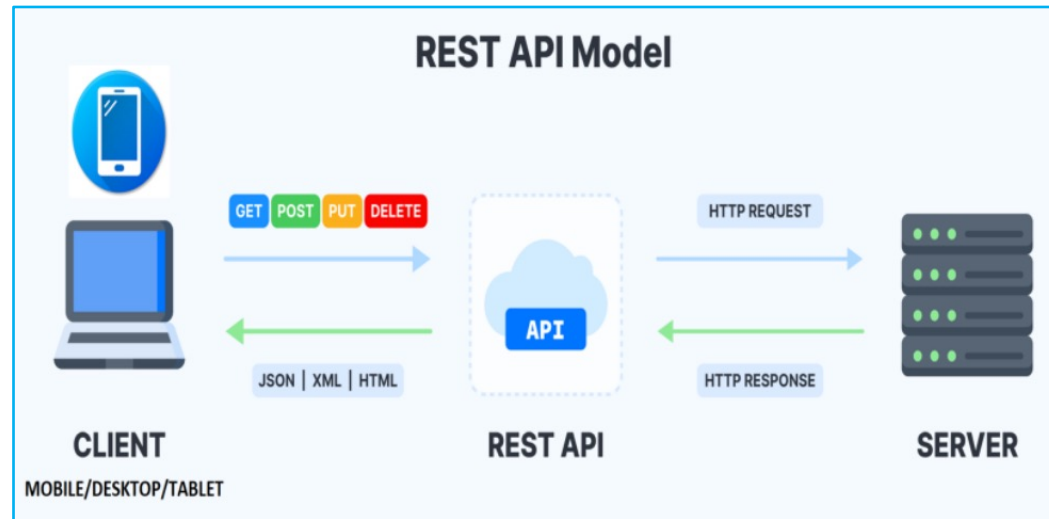
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REST APIs

- API - **A**pplication **P**rogramming **I**nterface: are mechanisms that enable two software components to communicate with each other using a set of definitions and protocols
- REST API - **R**epresentational **S**tate **T**ransfer API: REST defines a set of functions like GET, PUT, DELETE, etc. that clients can use to access server data. Clients and servers exchange data using HTTP



PROC HTTP

- Simple PROC HTTP call:

```
*--- Temporary filename for request response data;  
filename resp temp;
```

```
*--- Sample request to testing site;
```

```
proc http  
  url="http://httpbin.org/get"  
  method="GET"  
  out = resp;  
run;
```

	text
1	{
2	"args": {},
3	"headers": {
4	"Accept": "**/*",
5	"Host": "httpbin.org",
6	"User-Agent": "SAS/9",

```
NOTE: 200 OK  
NOTE: PROCEDURE HTTP used (Total process time):  
      real time          0.40 seconds  
      cpu time           0.01 seconds
```

CAPTURING NCI CONTROLLED TERMINOLOGY

```
%let model=SDTM; *CDISC model SDTM or ADaM;  
%let ct_date=2022-09-30; * CT release date;  
  
*--- URL download path;  
%let urlxls=%str(https://evs.nci.nih.gov/ftp1/CDISC/&model./  
Archive/&model.%20Terminology%20&ct_date..xls);  
  
*--- company area for storing CT;  
%let storexls=%str(P:\Company Shared Folders\CDISC\&model.\Controlled  
Terminology\&model. Terminology &ct_date..xls);  
  
*--- write file to CT area;  
filename storexls "&storexls";  
proc http  
  url= "&urlxls"  
  method="GET"  
  out=storexls;  
run;
```



← → ↻ 🔒 https://evs.nci.nih.gov/ftp1/CDISC/SDTM/Archive/		
	SDTM Terminology 2022-09-24.xls	2022-09-24 11:11 9.8M
	SDTM Terminology 2022-09-30.OWL.zip	2022-09-30 11:27 1.9M
	SDTM Terminology 2022-09-30.html	2022-09-30 11:27 16M
	SDTM Terminology 2022-09-30.odm.xml	2022-09-30 11:27 20M
	SDTM Terminology 2022-09-30.pdf	2022-09-30 11:27 8.6M
	SDTM Terminology 2022-09-30.txt	2022-09-30 11:26 11M
	SDTM Terminology 2022-09-30.xls	2022-09-30 11:27 10M

NCI CT with CDISC Library

- CDISC Library – open to all now (including non-members)
- API Key required
- One - stop shop for standards
- Default JSON response

```
%let model=SDTM; *CDISC model SDTM or ADaM;
%let ct_date=2022-09-30; * CT release date;

filename response "P:\Company Shared Folders\CDISC\&model.\Controlled
Terminology\&model.ct-&ct_date..xlsx";

proc http
  url = "https://library.cdisc.org/api/mdr/ct/packages/
        %lowercase(&model.)ct-&ct_date"
  out = response;
  headers "api-key"="&api_key."
          "Accept"="application/vnd.ms-excel";
run;
```

Microsoft SharePoint – what is it?

- Document management and collaboration platform
- Part of Microsoft 365 suite, relationship with Teams and Outlook
- Secured with user credentials
- Can be used by Study Teams for tracking deliverables in Excel Online
 - Easy collaboration
 - Completion status
 - Work allocation
 - Titles and footnotes

Microsoft SharePoint – Connection with SAS

- Access token for OAuth2 authentication
- Company level app created within Microsoft Azure
- REST-based Microsoft Graph API

```
https://graph.microsoft.com/v1.0/sites?search={query}
```

```
https://graph.microsoft.com/v1.0/sites/{site-id}/drives
```

```
https://graph.microsoft.com/v1.0/drives/{drive-id}/items/root/children
```

Microsoft SharePoint – Reading (GET)

`https://graph.microsoft.com/v1.0/sites?search=qc-trackers`

`https://graph.microsoft.com/v1.0/sites/&siteid./drives`

`https://graph.microsoft.com/v1.0/drives/&driveid./items/root/children`

name	webUrl	cTag	size	_microsoft_graph_downloadUrl
TEST TRACKER.xlsx	https://phastar1.sharepoint.com/sites/qc	"c:{FC0BE42A-EF12-452F-AB49-F4BCE	198620	https://phastar1.sharepoint.com/sites/qc

```
*--- mask download URL before passing to PROC HTTP;
data _null_;
  set tracker.value;
  call symputx("trackerurl",_microsoft_graph_downloadUrl);
run;

%let download=%superq(trackerurl);

*--- write XLSX to temporary work space;
filename fileout "%sysfunc(pathname(work))/tracker.xlsx";
proc http url="&download."
  method="GET"
  oauth_bearer="&access_token."
  out = fileout;
run;
```

Microsoft SharePoint – Writing Entire File (PUT)

```
*--- create a simple file to upload;
%let targetFile=sample.pdf;
filename tosave "%sysfunc(getoption(WORK))/&targetFile.";

ods pdf file=tosave;
proc print data=sashelp.class (obs=5);
run;
ods pdf close;

*--- upload PDF with PUT method;
filename resp temp;
proc http
url="https://graph.microsoft.com/v1.0/drives/&driveid./items/&folderid./&
targetFile./content"
method="PUT"
oauth_bearer="&access_token."
in=tosave
out=resp;
run;
```

A thumbnail of the 'sample.pdf' file. It displays the title 'The SAS System' above a table with 5 rows of data. The table has columns for 'Obs', 'Name', 'Sex', 'Age', 'Height', and 'Weight'.

The SAS System					
Obs	Name	Sex	Age	Height	Weight
1	Alfred	M	14	69.0	112.5
2	Alice	F	13	56.5	84.0
3	Barbara	F	13	65.3	98.0
4	Carol	F	14	62.8	102.5
5	Henry	M	14	63.5	102.5

Microsoft SharePoint – Updating File (PATCH)

*--- Put the body of the JSON content in external file;

```
filename json_in temp;
```

```
data _null_;
```

```
file json_in;
```

```
input;
```

```
put _infile_;
```

```
datalines;
```

```
{  
  "index": null,  
  "values": [  
    ["Table", "14.1.1", "Test titles 1", "DM201"],  
    ["Table", "14.1.2", "Test titles 2", "DM202"]  
  ]  
}
```

```
run;
```

*--- HTTP Patch request to update cell grouping based on JSON;

```
filename resp temp;
```

```
proc http
```

```
method="PATCH"
```

```
url="https://graph.microsoft.com/v1.0/me/drives/&driveid./
```

```
items/&fileid./workbook/worksheets/Outputs/range(address='A3:D4') "
```

```
ct="application/json"
```

```
oauth_bearer="&access_token"
```

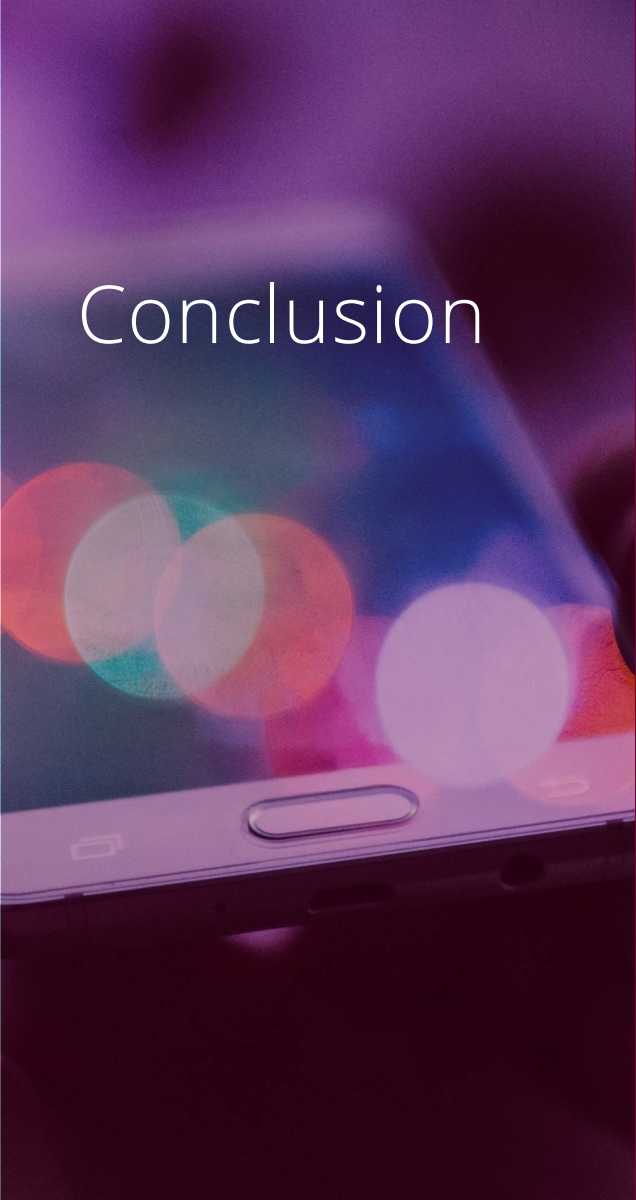
```
in=json_in
```

```
headerin=header
```

```
out=resp;
```

```
run;
```

A	B	C	D
Output Type	Output Number	Title	Output Name
Subject Disposition and Demographic			
Table	14.1.1	Test titles 1	DM201
Table	14.1.2	Test titles 2	DM202



Conclusion

SAS interaction with Cloud Data requires additional technical steps compared to working with local files but opens new possibilities.

Cloud documents enhance user collaboration and a programmatic link with REST APIs offer pathways to automate previous manual and error prone tasks.

General trend in industry towards automation and cloud based standards (CDISC Library, CDISC CORE) will increase interaction with Cloud Data.

Future Development

- Ongoing CDISC CORE Project is Cloud based, potential development opportunities with its implementation within PHASTAR programming environment
- Online dataset specifications

Any Questions?

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