Web Services and Student Events

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Student Events - CollegiateLinks

UIS Connection licensed CampusLabs’ CollegiateLink system for administering:

• Student Events / Activities

• Groups (e.g. Computer Science Club, Sororities, etc.)

...and wanted a way to publish the event data to the Campus
CollegiateLinks’ Web Service APIs

http://support.collegiatelink.net/hc/en-us/sections/200722564-Web-Services-API

- API (Version 2.0) - Introduction to the API
- API (Version 2.0) - Getting Started
- API (Version 2.0) - Connecting to the API (Security and Authentication)
- API (Version 2.0) - Working with Resources (Endpoints / Actions / Methods)
- API (Version 2.0) - Glossary of Terms
- API (Version 2.0) - Frequently Asked Questions
- Documentation for Web Services API (Version 2.0)
- API (Version 2.0) - /curriculumstatus
- API (Version 2.0) - /events ➞ EVENTS
- API (Version 2.0) - /attendees
- API (Version 2.0) - /organizations ➞ ORGANIZATIONS
- API (Version 2.0) - /experiences
- API (Version 2.0) - /financetransactions
- API (Version 2.0) - /financerequests
- API (Version 2.0) - /financeaccounts
- API (Version 2.0) - /memberships ➞ MEMBERSHIPS
- API (Version 2.0) - /positions
- API (Version 2.0) - /users
https://uis.collegiatelink.net/api/…

- **Filtering:**
  
  ...events?currentEventsOnly=true&startDate=<UTC>&endDate=<UTC>
  
  ...organizations? ← no filtering
  
  ...memberships?currentMembershipsOnly=true ← leave off for all members

- **Common across calls:**
  
  ...&pageSize=500&page=<x>
  ...&apikey=uis-01&random=<y>time=<UTC current time>&hash=<big #>
Hash is a combination of:

- **Public Key** ...also passed via URL and tied to server making the request

+ **IP address** ...request must come from this server and is tied to institution

+ **UTC time**

+ **Random value**

+ **Private Key** ...retrieved at run time using [get_passwd] from UIS’s encrypted password DB (which is based upon server – dev/test/prod, and the account asking for the password).
Use Oracle’s UTL_HTTP utility to stage XML directly into UIS’ DB

Use Oracle’s XMLTYPE to parse loaded object

Use exiting UIS utilities to send email to Campus Announcements from the DB
Not so fast...

• What’s in YOUR wallet?

Certificates for systems being accessed with Oracle’s network resources (UTL_HTTP) with SSL (HTTPS).

• ACLs privileges need to be defined (DBMS_NETWORK_ACL_ADMIN)

• Misc. utility privileges as well
grant execute on DBMS_NETWORK_ACL_ADMIN TO clink;
grant execute on HttpUriType to clink;
grant execute on UTL_HTTP to clink;
grant execute on UTL_TCP TO clink;
grant execute on UTL_SMTP TO clink;
grant execute on UTL_MAIL TO clink;
grant execute on UTL_INADDR to clink;

BEGIN
  DBMS_NETWORK_ACL_ADMIN.create_acl ( ACL => 'developer_access.xml',
     Description => 'Allows access to UTL_HTTP, UTL_SMTP etc',
     Principal => 'CLINK',
     Is_grant => TRUE, Privilege => 'connect', Start_date => SYSTIMESTAMP,
     End_date => NULL );
  DBMS_NETWORK_ACL_ADMIN.ADD_PRIVILEGE('developer_access.xml','CLINK', TRUE, 'resolve');
  commit;
END;
ACLs and Wallets, cont.

BEGIN

DBMS_NETWORK_ACL_ADMIN.assign_acl ( Acl => 'developer_access.xml', Host => '*.uis.edu' , lower_port => X, upper_port => Z );

DBMS_NETWORK_ACL_ADMIN.assign_acl ( Acl => 'developer_access.xml', Host => '*.collegiatelink.net' , lower_port => X, upper_port => Z );

DBMS_NETWORK_ACL_ADMIN.assign_acl ( Acl => 'developer_access.xml', Host => '*.xmlfiles.com' , lower_port => X, upper_port => Z );

Commit;
End;

EXEC dbms_java.grant_permission ('CLINK', 'SYS:java.lang.RuntimePermission', 'writeFileDescriptor', '');
EXEC dbms_java.grant_permission ('CLINK', 'SYS:java.lang.RuntimePermission', 'readFileDescriptor', '');

EXEC dbms_java.grant_permission ('CLINK', 'SYS:java.io.FilePermission', '/bin/sh', 'execute');
EXEC dbms_java.grant_permission ('CLINK', 'SYS:java.io.FilePermission', '/bin/bash', 'execute');

EXEC dbms_java.grant_permission ('UIS_UTILS', 'SYS:java.lang.RuntimePermission', 'writeFileDescriptor', '');
EXEC dbms_java.grant_permission ('UIS_UTILS', 'SYS:java.lang.RuntimePermission', 'readFileDescriptor', '');

EXEC dbms_java.grant_permission ('UIS_UTILS', 'SYS:java.io.FilePermission', '/bin/sh', 'execute');
EXEC dbms_java.grant_permission ('UIS_UTILS', 'SYS:java.io.FilePermission', '/bin/bash', 'execute');
Speed bumps...

• Create SHA256SUM hash for the CollegiateLink URL
  → public key + IP address + UTC time + random value + private key

• UTC time is not readily available in Oracle
  → retrieved and parsed in OS (bash) using Java calls from Oracle
  → Code: http://uisgplprod1.uis.edu/gitlist/utils/tree/master/oracle/java/

• Even with the Wallet and ACLs in place, errors still were thrown accessing
  https://uis.collegiatelink.net/api/
The Work Around

• Access CollegiateLink’s web service via the OS
  → Code: http://go.uis.edu/gitlist_CollegiateLink
  → at [clink_get_xml.sh] [-h] for prologue
  → uses [wget]
  → Paged retrievals used in support of large requests

• Saves the XML locally
  → $THIS_FEED_FILENAME = clink_<object>.xml
     ...under $THIS_DDIR/CollegiateLink/<object>
     ...which is symbolically linked under Web Root
     ...at: http://uisgplprod.uis.edu/web_services/CollegiateLink/ by object type

→ Previous run is moved to […]/<object>/archive]
Architecture – Round 2

- Pull XML local and then use Oracle’s UTL_HTTP utility to stage XML into UIS’ DB
- Use Oracle’s XMLTYPE to parse loaded object
- Use exiting UIS utilities to send email to Campus Announcements from the DB

Diagram:
- CollegiateLinks
- UIS Server
- UIS DB
- Campus Announcements email

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More Speed Bumps...

- Some data from CollegiateLink is HTML encoded, and needs to be decoded (when parsing the XML)
  - Decode using UTL_I18N.UNESCAPE_REFERENCE
  - Code: [http://go.uis.edu/gitlist_CollegiateLink](http://go.uis.edu/gitlist_CollegiateLink)
  - at [sql/clink_api.sql] – see [parse_<object>_xml] procedures

- Microsoft Outlook does not play nicely with HTML with images (when trying to get messages to display responsively).

- Oracle’s default character set should be AL32UTF8, having this as the extended character set won’t work (e.g. Greek Letters)
  - Why? UTL_HTTP’s API only uses VARCHAR2 (not NVARCHAR2)
Some High Level Details

wget https://uis.collegiatelink.net/api/ object

CollegiateLinks

UIS Server

UIS DB

Load XML: clink_api.stg_<object> into [clink.STG_CLINK_XML]

Parse XML: clink_api.parse_<object>_<xml> into [clink.CLINK_<OBJECT>]

Send email to Campus Announcements

Campus Announcements email
Some Low Level Details

- All XML objects are stored in clink.STG_CLINK_XML
  - As an XMLDATA type field, denoted by Object Type
  - IsProcessed flag lets us know if the XML object has been parsed

- Each XML object is parsed into it’s own table
  - Prefaced with “clink_”
  - Organizations has 2 additional tables: CLink_Orgs_Category, CLink_Orgs_WebSites

- Item retrieval per object does so X days ahead (to guard against an outage at CollegiateLink).

- You will need to provide CollegiateLink with credentials for each server you pull from (dev/test/prod)

- When pulling XML, be sure to set content type as UTF8
Some More Details

clink.WEBSVVC_REFRESH – API for logging and ensuring concurrency of run requests.

→ Code: [http://go.uis.edu/gitlist_CollegiateLink](http://go.uis.edu/gitlist_CollegiateLink)

→ at [sql/websvc_refresh.pkb] – see [request]

```python
...request( 'CLINK', 'STG_CLINK_XML', 'EVENTS' ) → clink_api.STG_EVENTS()
...request( 'CLINK', 'CLINK_EVENTS', 'EVENTS' ) → clink_api.PARSEEVENTSXML()

...request( 'CLINK', 'STG_CLINK_XML', 'ORGANIZATIONS' ) → clink_api.STG_ORGANIZATIONS()
...request( 'CLINK', 'CLINK_EVENTS', 'ORGANIZATIONS' ) → clink_api.PARSEORGANIZATIONSXML()

...request( 'CLINK', 'STG_CLINK_XML', 'MEMBERSHIPS' ) → clink_api.STG_MEMBERSHIPS()
...request( 'CLINK', 'CLINK_MEMBERSHIPS', 'MEMBERSHIPS' ) → clink_api.PARSEMEMBERSHIPSXML()
```
Load the XML

XML - http://uisgplprod.uis.edu/web_services/CollegiateLink/events/clink_events.xml

clink_api.LOAD_WEBSVC_OBJ( p_obj_type )
...where p_obj_type is in { EVENTS, ORGANIZATIONS, MEMBERSHIPS }

_l_http_request := utl_http.BEGIN_REQUEST( l_webservice_url )

utl_http.SET_HEADER(l_http_request, 'Content-Type', 'text/xml;charset=UTF-8')

_l_http_response := utl_http.GET_RESPONSE(l_http_request)

utl_http.READ_TEXT( l_http_response, l_text, 32767 )
...read in this many bytes at a time (looping)

utl_http.END_RESPONSE(l_http_response) -- when finished reading
clink_api.PARSE_EVENTS_XML()

- [ l_xml ] holds the entire contents of the XML file that was staged into the DB

- while l_xml.EXISTSNODE('//@ResultOfEvent/Items/Event[ v_count ]') = 1 loop

  v_eventname := l_xml.extract('//@ResultOfEvent/Items/Event[ v_count ]/EventName/text()');
  l_eventname := v_eventname.getStringVal();
  -- decode for HTML
  l_eventname := utl_i18n.UNESCAPE_REFERENCE(l_eventname);
  l_stringprstartdate := v_positionrecordedstartdate.getStringVal();
  -- Process UTC dates
  l_stringprstartdate := uis_utils.os_cmd.oscomm('./bin/date -d @ ' SUBSTR(l_stringprstartdate, 1, 10) '+%F %T');
  l_positionrecordedstartdate := TO_DATE(l_stringprstartdate, 'YYYY/MM/DD HH24:MI:SS');
Parse the XML, cont.

clink_api.PARSE_<object>_XML()
...e.g. clink_api.PARSE_EVENTS_XML()

Given the overlapping look ahead loading scheme used, Entries are merged into the target object table (e.g. CLINK_EVENTS) –

• Support for updates

• Guards against outages at CollegiateLink
Student Events - Email

clink SEND EMAIL
- Filters the set of Student Events by a start and stop date
- Uses the in-house [uis_utils.uis_sendmail.send_html] utility
  ...which allows for custom theming by application (the header and footer)

Example Email
Some useful tools

* UTC for humans:  https://www.epochconverter.com/

* Related Code:

  CollegiateLink [datafeeds] repo in GIT -
  http://uisgplprod.uis.edu/gitlist/datafeeds/tree/master/CollegiateLink

  Utilities [utils] repo in GIT –
  
  • uis_sendmail -
  http://uisgplprod.uis.edu/gitlist/utils/tree/master/oracle/email
  
  • os_cmd -  http://uisgplprod.uis.edu/gitlist/utils/tree/master/oracle/java
  ...
  os_cmd.OSCOMM() – can be used for calling any OS command
  
  • get_passwd – upon request

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Questions?

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