

# Best Practices for Building Your LTI Advantage & REST Applications for Learn

Mark Bykerk Kauffman, Senior Partner Software Engineer

# **Session Topics**

### Welcome and Introductions

### Resources

### **Best Practices**

- Registration/Creation
- Design
- Release

### Introductions

### Mark Bykerk Kauffman, M.S. C.S.

- Anthology+Blackboard's Partner Software Engineer/ 7+ years
- Former Learn Admin & Dev @ CSU Chico
- Scientist/Engineer @ Hewlett-Packard
  - Report Generation System & Method, US Patent# 7031979
- Hobbies: Software, 6X marathons, Hiking & Gaming



## Forward-Looking Statement Statements regarding our product development i

Statements regarding our product development initiatives, including new products and future product upgrades, updates or enhancements represent our current intentions, but may be modified, delayed or abandoned without prior notice and there is no assurance that such offering, upgrades, updates or functionality will become available unless and until they have been made generally available to our customers.



### Resources

### Resources

### Documentation

- help.blackboard.com\* "Help"
- docs.anthology.com "Docs"
- developer.blackboard.com "Dev Portal"
  - Application Registration
  - REST API Swagger Documentation
- LTI Advantage Specifications
  - https://www.imsglobal.org/spec/lti/v1p3/
- docs.blackboard.com Best Practice:
  - Use Search

### Connections

- Technical Office Hours
  - Wed 11am ET
- Blackboard Techies Slack Channel
- developers@blackboard.com
- community.blackboard.com

Best Practice: An internet search for "Blackboard API documentation" or "Blackboard Technical Office Hours" or "Blackboard Techies Slack" will find these resources.

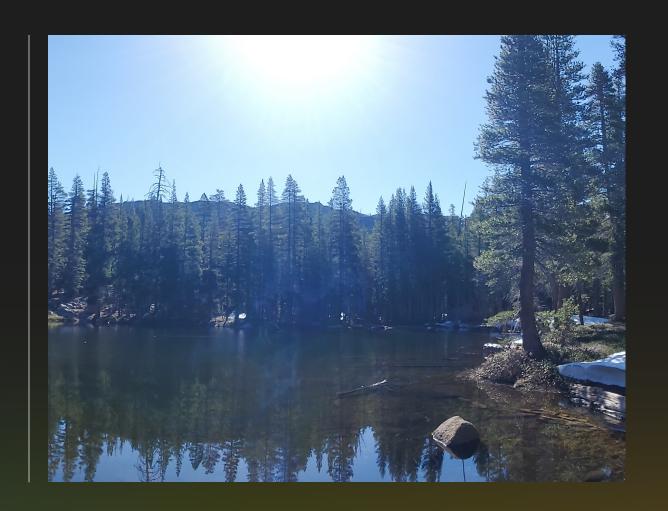
<sup>\*</sup> FQDNs and emails current at the time of writing. Blackboard is now part of Anthology. You may need to replace .blackboard.com with anthology.com.



# Best Practices: Registration and Application Creation

### Registration/Creation

- Register to Get One Application
   ID/Client ID for Use by All Clients
- Use an Organizational Email to Register Production Group/App ID
- First/Last Name is Shown as Developer In Learn
- Request a Production Group
- Follow LTI 1.3 Guidelines



### Register to Get One Application ID/Client ID for Use by All Clients

- See: https://docs.blackboard.com/rest-apis/learn/getting-started/first-steps
- If you are an Anthology client, an Anthology Partner / Vendor / Developer of a REST Application should NEVER tell you to go to the developer portal and create an App ID with the associated key/secret to install their application. They should never tell you to apply for a Rate/Site increase for their application. Anthology DOES NOT support that model. Developers must get exactly one application ID for their application to be installed on every Learn system that is to be using that application.

### Register to Get One Application ID/Client ID for Use by All Clients

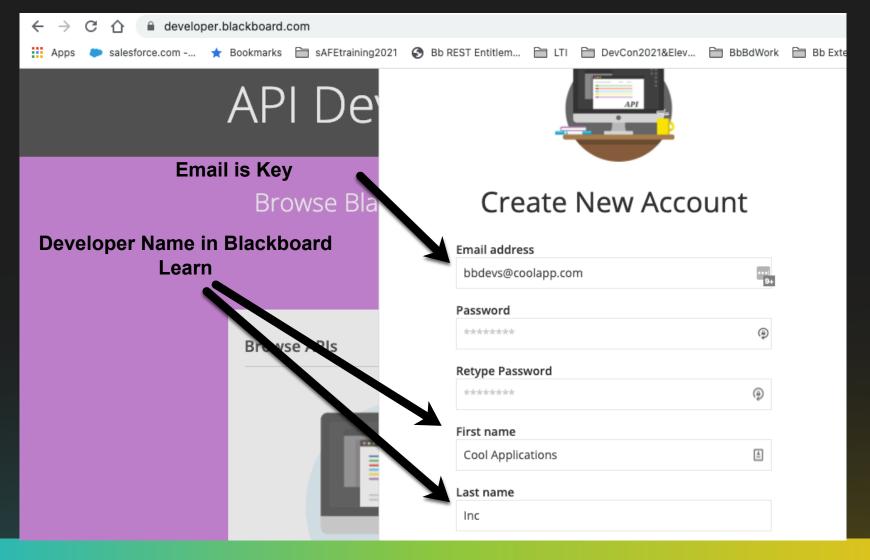
- One App ID → One Production Grup → One Rate Limit Request
  - − → Happy Clients!
- REST Application ID / LTI 1.3 Client ID Synonyms
- One ID Used In Production per Application/Tool
  - LTI 1.3 Specification: "A tool MUST thus allow multiple deployments on a given platform to share the same client\_id and the security contract attached to it.."
  - The same applies to REST API Applications\*
- Deployment ID in LTI 1.3 Launch to Differentiate Between Learn Installations
- Never Share Key/Secret With Client or Anyone



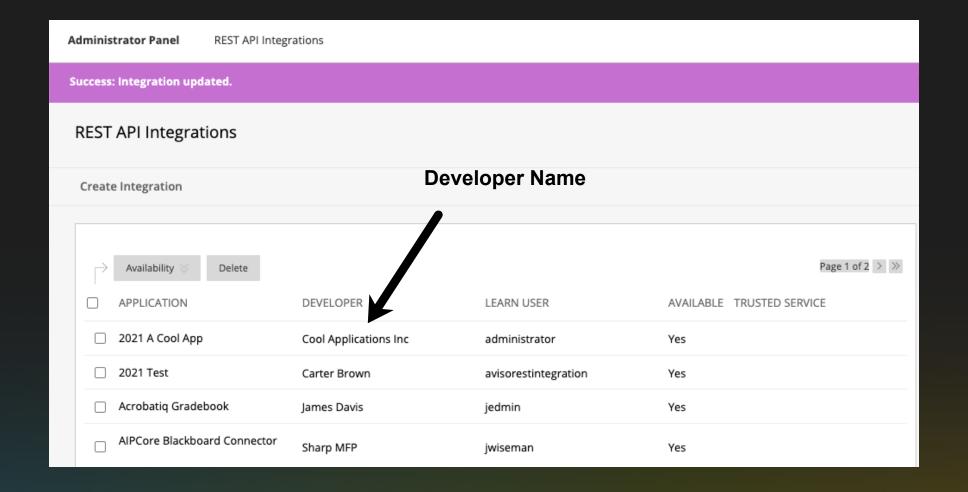
### Register With an Organizational Email

- Never lose access as individuals come and go
- Example: anthdevs@coolcorp.com

### Use An Organizational Email to Register



### First/Last Name is Shown As "Developer" In Learn



Anthology manages your applications by the Group they are in. The group affects site and rate limits. We do not manage by application ID. We need the email address and the Group name. Let's talk about Groups.

Many applications from many developers can have the same name. Only one Group from all developers can have a given name. I.E Group names are unique across all registrations on the developer portal.

You may create additional groups for your applications — but you may only have one Production Group.

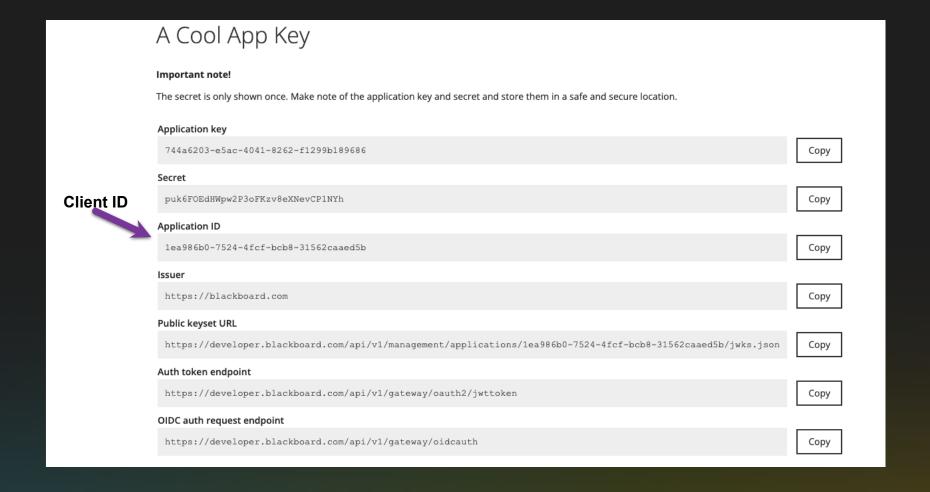
### Information Needed For Rate/Site Increase

- Email Used for Registration
- Production Group Name that You Created
- Requested Rate Limit and/or Requested Site Limit
- DO NOT ASK A CLIENT TO DO THIS FOR YOU

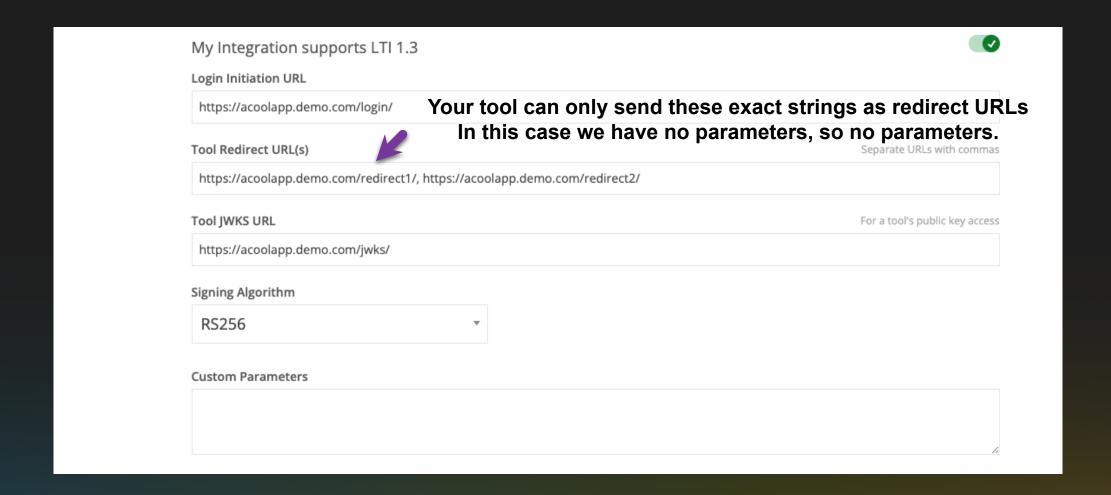
### Follow LTI 1.3 Guidelines

- Client ID is Application ID
- Tool Can Only Send Exact Redirect URIs As Registered
  - redirect\_uri is OAuth2 protocol
    - Not meant for appending variable LTI resource IDs
  - -Cause of Invalid Redirect URL Errors
  - Cannot add or modify parameters at run time

### Client ID is Application ID



### Tool Can Only Send Exact Redirect URLs As Registered



### Design

- Use LTI Custom Parameters or Target URL
- Return LTI Data Claim
- Design for Conversion from LTI 1.1 to LTI
   1.3 Launch
- Efficiency Use Filter and Expand
- Security: 3LO or 2LO
- 2LO Use Tools To Map Entitlements to Privileges
- Code to Monitor REST Response X-Headers



### Use LTI Custom Parameters or Target URL

### Use LTI Custom Parameters or Target URI

- To Specify Resource to Display
- https://www.imsglobal.org/spec/lti/v1p3/ 5.3.4
  - "The target link URI is the actual endpoint for the LTI resource to display"
- Not Via Parameters Appended to redirect\_uri
  - redirect\_uri is for Oauth2 flow and not meant for specifying LTI resources.

### Return LTI Data Claim

### Return LTI Data Claim

- https://community.blackboard.com/blogs/4/793
- <a href="https://www.imsglobal.org/spec/lti-dl/v2p0">https://www.imsglobal.org/spec/lti-dl/v2p0</a> Section 3.4.1
  - http://www.imsglobal.org/spec/lti-dl/v2p0#data
  - "This claim is required if present in LtiDeepLinkingRequest message."
  - Though listed in the specification as "optional," it's required for the Tool to include in the Deep Link Response when it's received from the Platform.

# Design for Conversion From LTI 1.1 to LTI 1.3 Launch

### Design for Conversion From LTI 1.1 to LTI 1.3 Launch

- When LTI 1.3 Deployed to Learn
  - Learn Converts LTI 1.1 Tool With Same FQDN to LTI 1.3
  - Your Tool Needs to Handle Launches That Have Been Converted
  - https://youtu.be/5bsBn1\_UDUI
  - launchLink Contains LTI 1.1 Resource as target\_link\_uri
    - target\_link\_uri=https%3A%2F%2Fmyvids.server.com%2FLMSEntry.jsp%3FredirectURL%3Dhttp s%253A%252F%252Fmyvids.server.com%252FV%252FVideo%253Fv%253D3987455%2526a% 253D585372665
  - Use the Target Link Claim
    - Do Not Append as Parameter to OAuth2 redirect uri

Improve your application's efficiency and performance by using filter and expand parameters.

### Filtering Example With Course Memberships

- docs.blackboard.com
- GET /learn/api/public/v1/courses/{courseId}/users
- Parameters
  - role, created & createdCompare, dataSourceId, lastAccessed, lastAccessedCompare, availability.available
  - fields: A comma-delimited list of fields to include in the response. If not specified, all fields will be returned

Application Security: 3LO or 2LO?

### Application Security: 3LO (Three-legged OAuth2)

- <a href="https://github.com/Kong/mashape-oauth/blob/master/FLOWS.md#oauth-2-three-legged">https://github.com/Kong/mashape-oauth/blob/master/FLOWS.md#oauth-2-three-legged</a>
- https://docs.blackboard.com/rest-apis/learn/getting-started/3lo
- When attempting to use your REST Application, user redirected to login into their Learn system.
  - /learn/api/public/v1/oauth2/authorizationcode
- After login, the user's access token can only be used to make REST API calls from your application
  with the same privileges they have to do the same operation via the Learn user interface when
  they are logged into that system.
  - /learn/api/public/v1/oauth2/token

### Application Security: 2LO (Two-legged OAuth2/Basic)

- https://github.com/Kong/mashape-oauth/blob/master/FLOWS.md#oauth-2-two-legged
- https://docs.blackboard.com/learn/rest/getting-started/basic-authentication
- When attempting to use your REST Application, you application passes a key and secret to authenticate.
  - curl -k --user <key>:<secret> --data "grant\_type=client\_credentials" https://<LearnHost>/learn/api/public/v1/oauth2/token
- The REST Application has been installed on the Learn system with an associated user on that system.
- Using the token retrieved from the above call, the REST Application can make all API calls that have the same privileges that the <u>associated user</u> has. Those privileges are determined by the user's System Role(s).
- Potential pitfall the associated user may over or under privileged. You must determine exactly what your application needs and create a system role to assign that user that has the necessary privileges as mapped to the REST API entitlements shown in the REST API Swagger documentation.

Use the tools to map REST API entitlement requirements to System Role privileges.

### REST entitlements to System Role Privileges Mapping Tools

- https://docs.blackboard.com/rest-apis/learn/getting-started/bookmarklet.html
  - Converting Entitlements to GUI Privileges
    - (REST API Entitlements to System Role Privileges)
- Bookmarklet To Help Map Entitlements To Permissions
  - javascript:(function()%7Bif('jQuery'%20in%20window)%7Blet%20showUids%3D(jq)%3D%3E%7Bjq('tbody%23listContainer\_databody%20%3E%20tr').each((i%2Ctr)%3D%3E%7B%20var%20val%20%3D%20jq('input%5Btype%3Dcheckbox%5D'%2C%20tr).prop('value')%3B%20jq('th'%2C%20tr).append('%3Cdiv%3E%3Ci%3E'%2Bval%2B'%3C%2Fi%3E%3C%2Fdiv%3E')%3B%20%7D)%7D%3Blet%20ws%3D%5B%5D%3Bws.push(window)%3Blet%20ifr%3DjQuery('iframe').prop('contentWindow')%3Bif(ifr)%7Bws.push(ifr)%3B%7Dws.forEach((w)%3D%3E%7BshowUids(w.jQuery)%3B%7D)%3B%7D%7D)()
  - Simply create a new bookmark in your browser, paste this code in, and save it.

Key takeaway: Providing the required Privileges to Learn Admins reduces the risk of a failure in integration installation and operation. Neither Anthology nor you should want to burden clients with figuring out from the API Docs which Entitlements are needed and look up these Privileges on their own so that your application works as expected.

### Monitor X-Headers

HTTP Header Description

X-Rate-Limit-Limit

The rate limit ceiling for the given development group

X-Rate-Limit-Remaining

The number of requests left for the 24-hour period for the development group

X-Rate-Limit-Reset The remaining time before the rate limit resets, given in UTC epoch seconds

### Release



- Document: Enable LTI Roles In Learn
- Convert LTI 1.1 Never Delete
- Move Application to Production Group
- Inform Anthology
- Track Site Installations

### Document: Enable LTI Roles In Learn

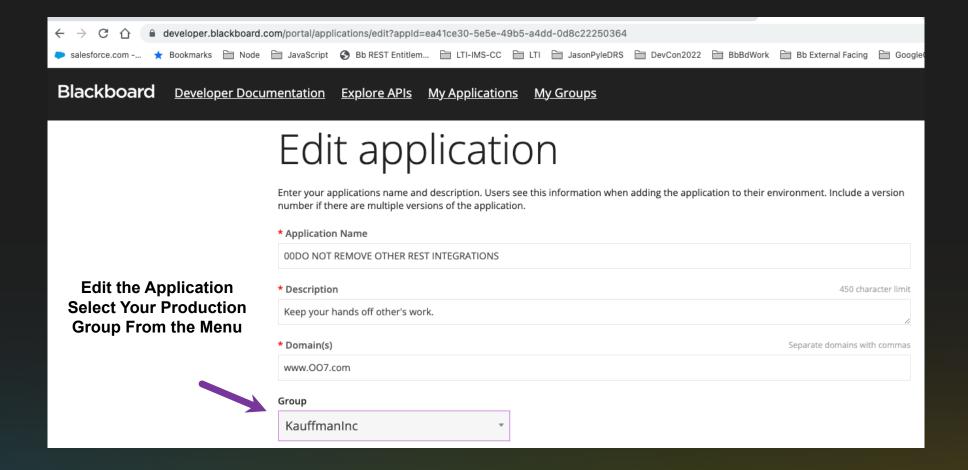


'https://purl.imsglobal.org/spec/lti/claim/roles': [],

### Convert LTI 1.1 to LTI 1.3 – Never Delete

- When a vendor has an LTI 1.1 integration installed on a domain, say great.videos.com, and their LTI 1.3 integration uses the same domain, you may be able to keep your course links active by simply registering the LTI 1.3 integration. You will be prompted to migrate from the LTI 1.1 installation.
- https://youtu.be/5bsBn1\_UDUI

### Move Application to Production Group



### Inform Anthology

- Partners & Clients: File a Behind the Blackboard Ticket
- Community Members Send email to <u>developers@blackboard.com</u>
- https://docs.blackboard.com/rest-apis/learn/admin/groups-quotas-rates
  - Production group name. Designate one of your groups as a production group if you haven't. Follow the process
    described above for creating the group name. This should be your CamelCaseCompanyName. Tell us the name in
    the ticket.
  - Developer email that owns the production group. One of your developers created the account that is creating
    REST API apps and groups on developer.blackboard.com. When that developer creates your
    CamelCaseCompanyName production group, that developer's email is the "Developer email" referenced here.
  - A description of the application, both what it does, and which APIs used.

Keep track of the number of sites that have installed your application that is in your Production Group – so you can ask for more before you run out.

### **Closing Reminder**

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Ref: https://docs.blackboard.com/rest-apis/learn/getting-started/first-steps

### Questions? developers@blackboard.com



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