

2 Patching Moodle 4.0 to allow integration with SLS

Current Situation

Moodle 4.0 supports LTI 1.3 and LTI Advantage

SLS partially supports LTI 1.3 and does not support LTI Advantage

References:

- Publish as LTI tool in Moodle, available at [https://docs.moodle.org/400/en/Publish as LTI tool#Custom launch parameters](https://docs.moodle.org/400/en/Publish_as_LTI_tool#Custom_launch_parameters)
- List of LTI Advantage certified products, available at <https://www.msglobal.org/ltiadvantage>
- Integration with SLS, available at <https://docs.learning.moe.edu.sg/sls/partners/integration/integrationsls.html>

Patch for resource identification

Moodle 4.0 supports two targets link uris:

- [MOODLE_40]/enrol/lti/launch.php endpoint (for regular resource link launches)
- [MOODLE_40]/enrol/lti/launch_deeplink.php endpoint (for deep linking launches)

Moreover, Moodle 4.0 requires that the resource identification by the custom claim field 'id'.

For example, a valid launch request for Moodle could be the following one:

```
{
  "sub": "f25afda7-b05b-4b70-82b5-2f285f1807fe",
  "name": "Loo Kang, Wee",
  "https://purl.msglobal.org/spec/lti/claim/roles": [
    "http://purl.msglobal.org/vocab/lis/v2/institution/person#Instructor"
  ],
  "iss": "https://vle.dev.sls.ufinity.com",
  "aud": [ "76b5f118-d6b0-4a6b-9cfa-00fa3387e3d9" ],
  "nonce": "nonce-7964af86f762fdac04fdaa4286650308f2c63cb92dba8f2a21e226049a65c8c5",
  "iat": 1660698910,
  "exp": 1660699210,
  "https://purl.msglobal.org/spec/lti/claim/message_type": "LtiResourceLinkRequest",
  "https://purl.msglobal.org/spec/lti/claim/version": "1.3.0",
  "https://purl.msglobal.org/spec/lti/claim/deployment_id":
    "9ebbd42f-0f45-41f8-b25b-8cf5aef68d02",
  "https://purl.msglobal.org/spec/lti/claim/target_link_uri":
    "https://iwant2study.org/moodle402/enrol/lti/launch.php ",
  "https://purl.msglobal.org/spec/lti/claim/resource_link": {
    "id": "13d6485e-2482-49d4-bbc5-f9dec785d5cf_890743021_1660698910",
    "title": null,
    "description": null
  },
  "https://purl.msglobal.org/spec/lti/claim/context": null,
  "https://purl.msglobal.org/spec/lti/claim/role_scope_mentor": [],
  "https://purl.msglobal.org/spec/lti-nrps/claim/roleservice": null,
  "https://purl.msglobal.org/spec/lti/claim/custom": {
    "id": "68b09cbe-85fc-4777-be2d-d6d8c219f775"
  }
}
```

Moodle implements the resource identification consistently with the LTI 1.3 specification. See https://www.msglobal.org/spec/lti/v1p3/impl#do-not-use-resource_link-id

However, SLS does not allow to include the resource identification by the custom claim field 'id'.

We decided to patch Moodle to allow SLS to include the resource identification in the target link uri.

For example, a valid SLS launch request for Moodle could be the following one:

```
{
  "sub": "f25afda7-b05b-4b70-82b5-2f285f1807fe",
  "name": "Loo Kang, Wee",
  "https://purl.imsglobal.org/spec/lti/claim/roles": [
    "http://purl.imsglobal.org/vocab/lis/v2/institution/person#Instructor"
  ],
  "iss": "https://vle.dev.sls.ufinity.com",
  "aud": ["76b5f118-d6b0-4a6b-9cfa-00fa3387e3d9"],
  "nonce": "nonce-7964af86f762fdac04fdaa4286650308f2c63cb92dba8f2a21e226049a65c8c5",
  "iat": 1660698910,
  "exp": 1660699210,
  "https://purl.imsglobal.org/spec/lti/claim/message_type": "LtiResourceLinkRequest",
  "https://purl.imsglobal.org/spec/lti/claim/version": "1.3.0",
  "https://purl.imsglobal.org/spec/lti/claim/deployment_id":
    "9ebbd42f-0f45-41f8-b25b-8cf5aef68d02",
  "https://purl.imsglobal.org/spec/lti/claim/target_link_uri":
    "https://iwant2study.org/moodle402/enrol/lti/launch.php?id=68b09cbe-85fc-4777-be2d-d6d8c219f775",
  "https://purl.imsglobal.org/spec/lti/claim/resource_link": {
    "id": "13d6485e-2482-49d4-bbc5-f9dec785d5cf_890743021_1660698910",
    "title": null,
    "description": null
  },
  "https://purl.imsglobal.org/spec/lti/claim/context": null,
  "https://purl.imsglobal.org/spec/lti/claim/role_scope_mentor": [],
  "https://purl.imsglobal.org/spec/lti-nrps/claim/roleservice": null,
  "https://purl.imsglobal.org/spec/lti/claim/custom": null
}
```

File: [MOODLE_40]/enrol/lti/login.php

```
// This code verifies the target_link_uri. Only two values are permitted (see endpoints listed
above).
>> if (!in_array($targetlinkuri, $validuris)) {
<< if (!in_array(strtok($targetlinkuri, '?'), $validuris)) {
    $msg = 'The target_link_uri param must match one of the redirect URIs set during tool
registration.';
    throw new coding_exception($msg);
}
```

File: [MOODLE_40]/lib/lti1p3/src/LtiMessageLaunch.php

>> means remove line

<< means add line

```
/**
 * Fetches the decoded body of the JWT used in the current launch.
 *
 * @return array|object returns the decoded json body of the launch as an array
 */
public function getLaunchData()
{
>> return $this->jwt['body'];
<< $launchdata = $this->jwt['body'];
<< if (strpos($launchdata['iss'], "vle.") !== false) {
<<     if (empty($launchdata['https://purl.imsglobal.org/spec/lti/claim/custom']['id'])) {
<<         $query =
parse_url($launchdata['https://purl.imsglobal.org/spec/lti/claim/target_link_uri'],
PHP_URL_QUERY);
<<         if (!empty($query)) {
```

```

<<         parse_str($query, $query_array);
<<         if (!empty($query_array['id'])) {
<<             $launchdata['https://purl.imsglobal.org/spec/lti/claim/custom'] = $query_array;
<<         }
<<     }
<< }
<< }
<< return $launchdata;
}

```

References:

- Learning Tools Interoperability Core Specification Version 1.3, available at https://docs.moodle.org/400/en/Publish_as_LTI_tool#Custom_launch_parameters

Patch for keeping SLS username and role in Moodle

New Moodle accounts will be automatically created for SLS users launching a resource from SLS platform. Because the SLS launch request does include the fields 'given_name' and 'family_name', Moodle generates a new account with a name that is difficult to be associated with SLS users.

We decided to patch Moodle to include the missing fields (based on the field 'name') in the SLS launch request.

Moreover, the role identifier used by the SLS platform is not identified adequately by Moodle. Specifically, Moodle requires role identifier with the prefix `http://purl.imsglobal.org/vocab/lis/v2/membership`, whereas SLS uses the prefix `http://purl.imsglobal.org/vocab/lis/v2/institution/person`.

We decided to patch Moodle to include the identification of the role used by SLS in Moodle.

Considering these patches, a valid SLS launch request for Moodle could be the following one:

```

{
  "sub": "f25afda7-b05b-4b70-82b5-2f285f1807fe",
  "name": "Loo Kang, Wee",
  "given_name": "Wee",
  "family_name": "Loo Kang",
  "https://purl.imsglobal.org/spec/lti/claim/roles": [
    "http://purl.imsglobal.org/vocab/lis/v2/membership#Instructor"
  ],
  "iss": "https://vle.dev.sls.ufinity.com",
  "aud": ["76b5f118-d6b0-4a6b-9cfa-00fa3387e3d9"],
  "nonce": "nonce-7964af86f762fdac04fdaa4286650308f2c63cb92dba8f2a21e226049a65c8c5",
  "iat": 1660698910,
  "exp": 1660699210,
  "https://purl.imsglobal.org/spec/lti/claim/message_type": "LtiResourceLinkRequest",
  "https://purl.imsglobal.org/spec/lti/claim/version": "1.3.0",
  "https://purl.imsglobal.org/spec/lti/claim/deployment_id":
    "9ebbd42f-0f45-41f8-b25b-8cf5aef68d02",
  "https://purl.imsglobal.org/spec/lti/claim/target_link_uri":
    "https://iwant2study.org/moodle402/enrol/lti/launch.php?id=68b09cbe-85fc-4777-be2d-d6d8c219f775",
  "https://purl.imsglobal.org/spec/lti/claim/resource_link": {
    "id": "13d6485e-2482-49d4-bbc5-f9dec785d5cf_890743021_1660698910",
    "title": null,
    "description": null
  },
  "https://purl.imsglobal.org/spec/lti/claim/context": null,
  "https://purl.imsglobal.org/spec/lti/claim/role_scope_mentor": [],
  "https://purl.imsglobal.org/spec/lti-nrps/claim/roleservice": null,
  "https://purl.imsglobal.org/spec/lti/claim/custom": null
}

```

File: [MOODLE_40]/lib/Lti1p3/src/LtiMessageLaunch.php

```

/**
 * Fetches the decoded body of the JWT used in the current launch.
 *
 * @return array|object returns the decoded json body of the launch as an array
 */
public function getLaunchData()
{
    $launchdata = $this->jwt['body'];
    if(strpos($launchdata['iss'], "vle.") !== false) {
        if (empty($launchdata['https://purl.imsglobal.org/spec/lti/claim/custom']['id'])) {
            $query =
parse_url($launchdata['https://purl.imsglobal.org/spec/lti/claim/target_link_uri'],
PHP_URL_QUERY);
            if (!empty($query)) {
                parse_str($query, $query_array);
                if (!empty($query_array['id'])) {
                    $launchdata['https://purl.imsglobal.org/spec/lti/claim/custom'] = $query_array;
                }
            }
        }
    }
    if (!empty($launchdata['name']) and
    empty($launchdata['given_name']) and
    empty($launchdata['family_name'])) {
        $parts = explode(" ", $launchdata['name']);
        $launchdata['given_name'] = trim($parts[0]);
        if (!empty($parts[1])) {
            $launchdata['family_name'] = trim($parts[1]);
        } else {
            // if not family name, set initials
            $launchdata['family_name'] = implode( ' ', array_map( function ( $word ) {
                return strtoupper( $word[0] );
            }, explode( ' ', $parts[0] ) ) );
        }
    }
    $launchroles = $launchdata['https://purl.imsglobal.org/spec/lti/claim/roles'] ?? null;
    if ($launchroles) {
        foreach ($launchroles as $key => $role) {
            if ($role == 'http://purl.imsglobal.org/vocab/lis/v2/institution/person#Instructor') {
                $launchroles[$key] =
'http://purl.imsglobal.org/vocab/lis/v2/membership#Instructor';
            } elseif ($role == 'http://purl.imsglobal.org/vocab/lis/v2/institution/person#Learner')
            {
                $launchroles[$key] = 'http://purl.imsglobal.org/vocab/lis/v2/membership#Learner';
            }
        }
        $launchdata['https://purl.imsglobal.org/spec/lti/claim/roles'] = $launchroles;
    }
    return $launchdata;
}

```

Reference:

- Role vocabularies, available at <https://www.imsglobal.org/spec/lti/v1p3/#role-vocabularies>

Patch for forcing embed simulation

Moodle uses the custom field 'force_embed' of the launch request to force embed view. This field is not sent by the SLS platform.

We decided to patch Moodle to include the custom field 'force_embed' in the SLS launch request.

Considering this patch, a valid SLS launch request for Moodle could be the following one:

```
{
  "sub": "f25afda7-b05b-4b70-82b5-2f285f1807fe",
  "name": "Loo Kang, Wee",
  "given_name": "Wee",
  "family_name": "Loo Kang",
  "https://purl.imsglobal.org/spec/lti/claim/roles": [
    "http://purl.imsglobal.org/vocab/lis/v2/membership#Instructor"
  ],
  "iss": "https://vle.dev.sls.ufinity.com",
  "aud": [ "76b5f118-d6b0-4a6b-9cfa-00fa3387e3d9" ],
  "nonce": "nonce-7964af86f762fdac04fdaa4286650308f2c63cb92dba8f2a21e226049a65c8c5",
  "iat": 1660698910,
  "exp": 1660699210,
  "https://purl.imsglobal.org/spec/lti/claim/message_type": "LtiResourceLinkRequest",
  "https://purl.imsglobal.org/spec/lti/claim/version": "1.3.0",
  "https://purl.imsglobal.org/spec/lti/claim/deployment_id":
    "9ebbd42f-0f45-41f8-b25b-8cf5aef68d02",
  "https://purl.imsglobal.org/spec/lti/claim/target_link_uri":
    "https://iwant2study.org/moodle402/enrol/lti/launch.php?id=68b09cbe-85fc-4777-be2d-d6d8c219f775",
  "https://purl.imsglobal.org/spec/lti/claim/resource_link": {
    "id": "13d6485e-2482-49d4-bbc5-f9dec785d5cf_890743021_1660698910",
    "title": null,
    "description": null
  },
  "https://purl.imsglobal.org/spec/lti/claim/context": null,
  "https://purl.imsglobal.org/spec/lti/claim/role_scope_mentor": [],
  "https://purl.imsglobal.org/spec/lti-nrps/claim/roleservice": null,
  "https://purl.imsglobal.org/spec/lti/claim/custom": {
    "force_embed": 1
  }
}
```

File: [MOODLE_40]/lib/Lti1p3/src/LtiMessageLaunch.php

```
/**
 * Fetches the decoded body of the JWT used in the current launch.
 *
 * @return array|object returns the decoded json body of the launch as an array
 */
public function getLaunchData()
{
    $launchdata = $this->jwt['body'];
    if (strpos($launchdata['iss'], 'vle.') !== false) {
        if (empty($launchdata['https://purl.imsglobal.org/spec/lti/claim/custom']['id'])) {
            $query =
                parse_url($launchdata['https://purl.imsglobal.org/spec/lti/claim/target_link_uri'],
                    PHP_URL_QUERY);
            if (!empty($query)) {
                parse_str($query, $query_array);
                if (!empty($query_array['id'])) {
                    $launchdata['https://purl.imsglobal.org/spec/lti/claim/custom'] = $query_array;
                }
            }
        }
    }
    if (!empty($launchdata['name']) and
        empty($launchdata['given_name']) and
        empty($launchdata['family_name'])) {
        $parts = explode(" ", $launchdata['name']);
        $launchdata['given_name'] = trim($parts[0]);
        if (!empty($parts[1])) {
            $launchdata['family_name'] = trim($parts[1]);
        } else {
            // if not family name, set initials
            $launchdata['family_name'] = implode(' ', array_map(function ($word) {
                return strtoupper($word[0]);
            }, explode(' ', $parts[0])));
        }
    }
}
```

```

    }
    $launchroles = $launchdata['https://purl.imsglobal.org/spec/lti/claim/roles'] ?? null;
    if ($launchroles) {
        foreach ($launchroles as $key => $role) {
            if ($role == 'http://purl.imsglobal.org/vocab/lis/v2/institution/person#Instructor') {
                $launchroles[$key] =
'http://purl.imsglobal.org/vocab/lis/v2/membership#Instructor';
            } elseif ($role == 'http://purl.imsglobal.org/vocab/lis/v2/institution/person#Learner')
            {
                $launchroles[$key] = 'http://purl.imsglobal.org/vocab/lis/v2/membership#Learner';
            }
        }
        $launchdata['https://purl.imsglobal.org/spec/lti/claim/roles'] = $launchroles;
    }
    $launchdata['https://purl.imsglobal.org/spec/lti/claim/custom']['force_embed'] = 1;
}
return $launchdata;
}

```

Patch for providing a simulation browser

Since the SLS platform does not provide a Deep Linking process compliant with the specification, we have defined an alternative way to allow users to select the resource.

When a Deep Linking process is requested to the LTI Launch URI, it replies to user with a resource browser. The user only needs to copy the resource URL into the configuration input.

File: [MOODLE_40]/enrol/lti/launch.php

```

>> // Special case for SLS, we show list of resources if deep linking request
>> // the deep linking must use launch_deeplink.php, but we provide this alternative way
>> // i.e. a launch request with deep linking type when we only want to see list of resources
>> if ($messagelaunch->isDeepLinkLaunch() && message_helper::is_instructor_launch($launchdata)) {
>>     $auth = get_auth_plugin('lti');
>>     $auth->complete_login(
>>         $launchdata,
>>         new moodle_url('/enrol/lti/launch.php', ['launchid' => $messagelaunch->getLaunchId()]),
>>         auth_plugin_lti::PROVISIONING_MODE_AUTO_ONLY,
>>         $legacyconsumersecrets ?? []
>>     );
>>     require_login(null, false);
>>     global $USER, $CFG;
>>
>>     $PAGE->set_context(context_system::instance());
>>     $url = new moodle_url('/enrol/lti/launch.php');
>>     $PAGE->set_url($url);
>>     $PAGE->set_pagelayout('popup');
>>     $PAGE->set_title(get_string('opentool', 'enrol_lti'));
>>
>>     // Get all the published resource view objects and render them for selection.
>>     $resourcerepo = new published_resource_repository();
>>     if (strpos($launchdata['iss'], "vle.") !== false &&
>>         message_helper::is_instructor_launch($launchdata)) {
>>         // Get all available LTI resources
>>         $user = \core_user::get_user_by_username('admin');
>>         $resources = $resourcerepo->find_all_for_user($user->id);
>>     } else {
>>         global $USER;
>>         $resources = $resourcerepo->find_all_for_user($USER->id);
>>     }
>>
>>     // renderer
>>     $urlpath = $launchdata["https://purl.imsglobal.org/spec/lti/claim/target_link_uri"];
>>     $context = [ 'courses' => [], 'deploymentid' =>
$launchdata["https://purl.imsglobal.org/spec/lti/claim/deployment_id"] ];
>>     foreach ($resources as $resource) {
>>         $context['courses'][$resource->get_courseid()]['fullname'] =
$resource->get_coursefullname();
>>         if (!$resource->is_course()) {

```

```
>>         $context['courses'][$resource->get_courseid()]['modules'][] = [
>>             'name' => $resource->get_name(),
>>             'id' => $resource->get_id(),
>>             'url' => $urlpath . "?id=" . $resource->get_uuid()
>>         ];
>>     } else {
>>         $context['courses'][$resource->get_courseid()]['id'] = $resource->get_id();
>>     }
>> }
>> $context['courses'] = array_values($context['courses']); // Reset keys for use in the
template.
>> echo $OUTPUT->header();
>> echo $OUTPUT->render_from_template('enrol_lti/local/ltiadvantage/content_show', $context);
>> echo $OUTPUT->footer();
>> } else {
>>     // To authenticate, we need the resource's account provisioning mode for the given LTI role.
>>     if (empty($launchdata['https://purl.imsglobal.org/spec/lti/claim/custom']['id'])) {
>>         throw new \moodle_exception('ltiadvlauncherror:missingid', 'enrol_lti');
>>     }
>>     ...
> }
```

In addition, this file requires the mustache template file

[MOODLE_40]/enrol/lti/templates/local/ltiadvantage/content_show.mustache