AL ගුරු OAuth 2.0 Application Report

Software Security Assignment 2
Sri Lanka Institute of Information Technology
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1. Summary

Advanced Level students who wishes to watch & study their relevant course subjects, on *"Nanasa"* television, could easily go this *AL ගුරු* app, use their *Google* account and sign in, select the necessary subjects & add them to their Google calendar, so they won't forget the time the program is telecasted.

This process is completed via, the OAuth framework, which includes an OAuth Resource Server & an OAuth Authorization Server facility, celebrating many roles, that are thoroughly explained in the report. Every step that was taken, are separately narrated with pertinent screenshots.

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2. Introduction

This application, initiated as we noticed the need of some application to keep tabs on programs, that may be crucial to a student. Hence, came up the *AL ගුරු* app. The backbone of this application, is the OAuth used, to authorize the app, through the students *Google* account, to add reminders in the *Google calendar.*

A framework that lends applications, permission to access some user accounts of preference on an HTTP facility, is basically what OAuth 2.0 is. It normally delivers flows of authorization for mobiles & desktop applications. The facility that hosts the user account, is assigned to the users by OAuth, & also the authorization of 3rd party applications to approach it.

The app, was basically made using, PHP, JS, HTML & CSS. This report will focus less on how the app was made, but all the codes used will be attached.

Basically, the implemented application utilizes the services of OAuth Authorization Servers and OAuth Resource Servers, sends requests to the OAuth authorization server to obtain the "access token", which during the flow, will stimulate user authentication, & finally, after the "OAuth access token" is acknowledged, invokes the resource server APIs to gain the protected resources or perform the particular action. This whole process is customized and elaborated to explain the use case that we used.

3. Implementation

3.1 AL ගුරු application

AL ගුරු app was created using HTML, CSS, PHP & JS (all codes/ project can be found in GitHub https://github.com/Madushani95/ALGuru: Check APPENDIX), to be finally hosted in the *Apache* web server – localhost. A web server was used in this scenario, because *AL ගුරු* app uses an "Authorization Code" grant type.

The above mentioned, OAuth was then used to proceed with the authorization process. But before going any further, the roles, in this process, the actors, & the interactions among them should be described.

3.2 OAuth Roles

- Resource owner: User/ AL (Advanced Level) Students → The students who authorizes *AL ගුරු* to access their user account (Google Account), using their user credentials. A read & write access is given *AL ගුරු*.
- Client: *AL ගුරු app* → The users particular account, is wished to be accessed by the *AL ගුරු* app. But before that, students handling this, must authorize it to do so, & API should validate the authorization.
- Resource Server: *Google calendar* → The protected user accounts are hosted by *Google calendar*.
- Authorization server: *Google*→ The user identity is verified using *Google* & then issues access tokens to *AL ගුරු*.

3.3 OAuth roles interaction & Abstract flow

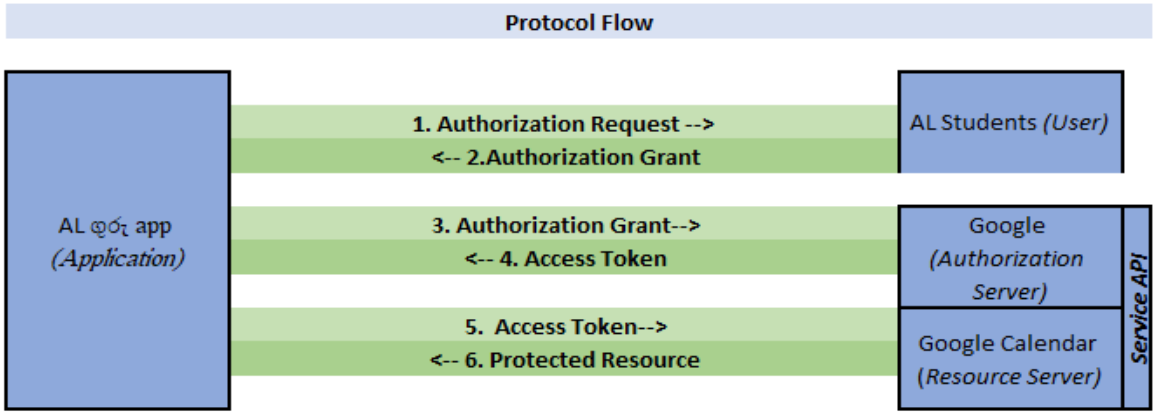

Figure 1 Abstract Protocol Flow

The used Protocol Flow can be discussed thoroughly as done below.

1. The *AL ගුරු app* requests from the *AL students,* authorization to access service resources.
2. When the *AL students* request authorized, the *AL ගුරු app* receives an authorization grant.
3. *AL ගුරු app* requests an access token from *Google* by presenting authentication of its own identity, and the authorization grant.
4. If the *AL ගුරු app* identity is authenticated and the authorization grant is valid, *Google* issues an access token to the *AL ගුරු app*. Authorization is complete.
5. *AL ගුරු app* then requests the resource from *Google Calendar* and presents the access token for authentication.
6. Upon the validation of the access token, *Google Calendar* serves the resource to the *AL ගුරු app.* Which is to add reminders in the calendar.

3.4 Project Creation

This section would give the reader, a step wise idea, of how the project was created.

3.4.1 Application Registration

1st of all, *AL ගුරු app* should be registered with the service. by creating a new project using the *Google developer dashboard*.

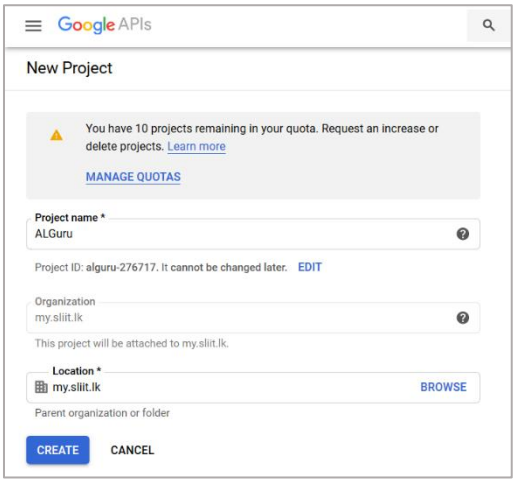

Figure 2 New Project

3.4.2 Google Calendar API

After the *AL ගුරු* project was created, *Google Calendar* API was added from API library.

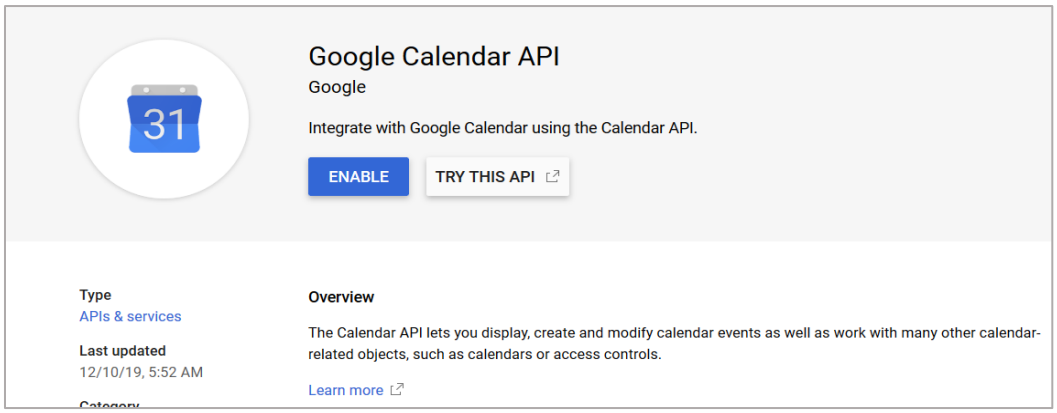

Figure 3 Google Calendar API

3.4.3 OAuth Consent

This enabled us to tell application, what type of data, is to be accessed from the student, in this scenario, just *"Internal"* (so that only SLIIT accounts are accessed)

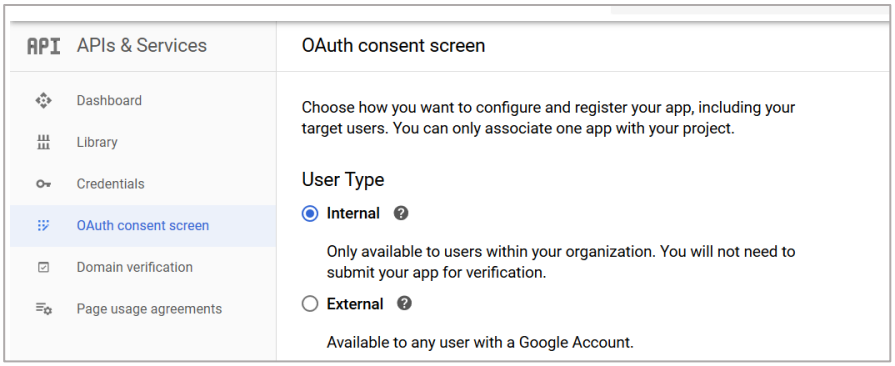

Figure 4 Consent Screen - User Type

3.4.4 OAuth Client ID

The, following form was filled with application type and redirection details. (i.e.to get the client credentials)

The "redirect URI" is anywhere the service will "redirect" afterwards they authorize *AL ඉරු*, & therefore the handling part of authorization codes or access tokens part of *AL ඉරු app* will be done by it.

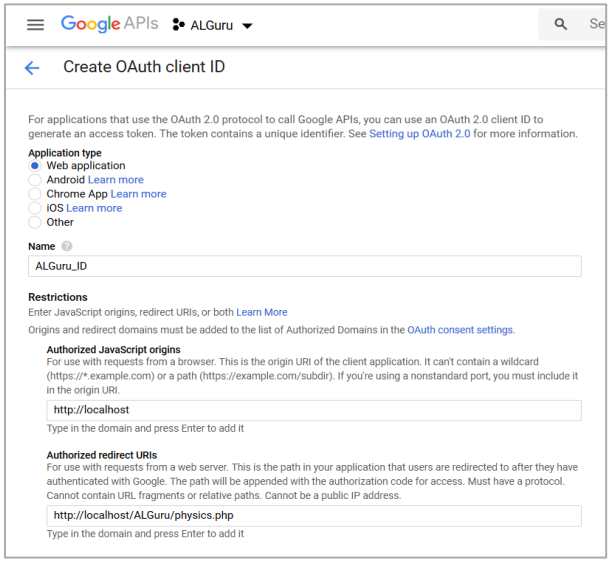

Figure 5 Creating OAuth Client ID

3.5 Client ID and Client Secret

After *AL ඉරු app* is enumerated, a "client identifier" & a "client secret" will be produced by the service.

The Client ID: To identify the *AL ඉරු app*, and to build authorization URLs that are presented to the AL students, a string, better a "publicly exposed string" that is used by the service API.

The Client Secret: Consumed to authenticate the identity of the *AL ඉරු app* to the service API when it requests to access the SLIIT account & is kept private between *AL ඉරු app* and the API.

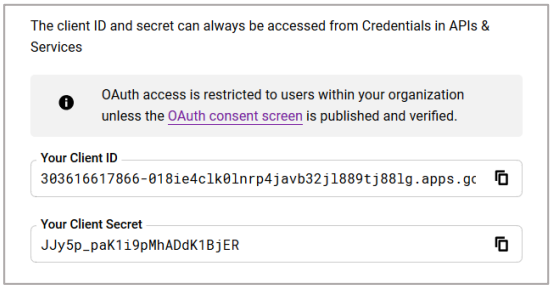

Figure 6 Client ID and Client Secret

3.6 API Key

This used to uniquely identify *AL ඉරු app.*

Figure 7 API Key

3.7 Installment of Google Client Library

```
$ composer require google/apiclient:^2.0
```

Figure 8 CLI code

3.8 PHP coding

PHP is used for the implementation of the authorization process and event creating process. This code is too included in Github (https://github.com/Madushani95/ALGuru: Check APPENDIX)

4. How it works

4.1 Authorization Grant

The authorization grant type, or "How the authorization is given to this application", for this use case is an *Authorization Code*.

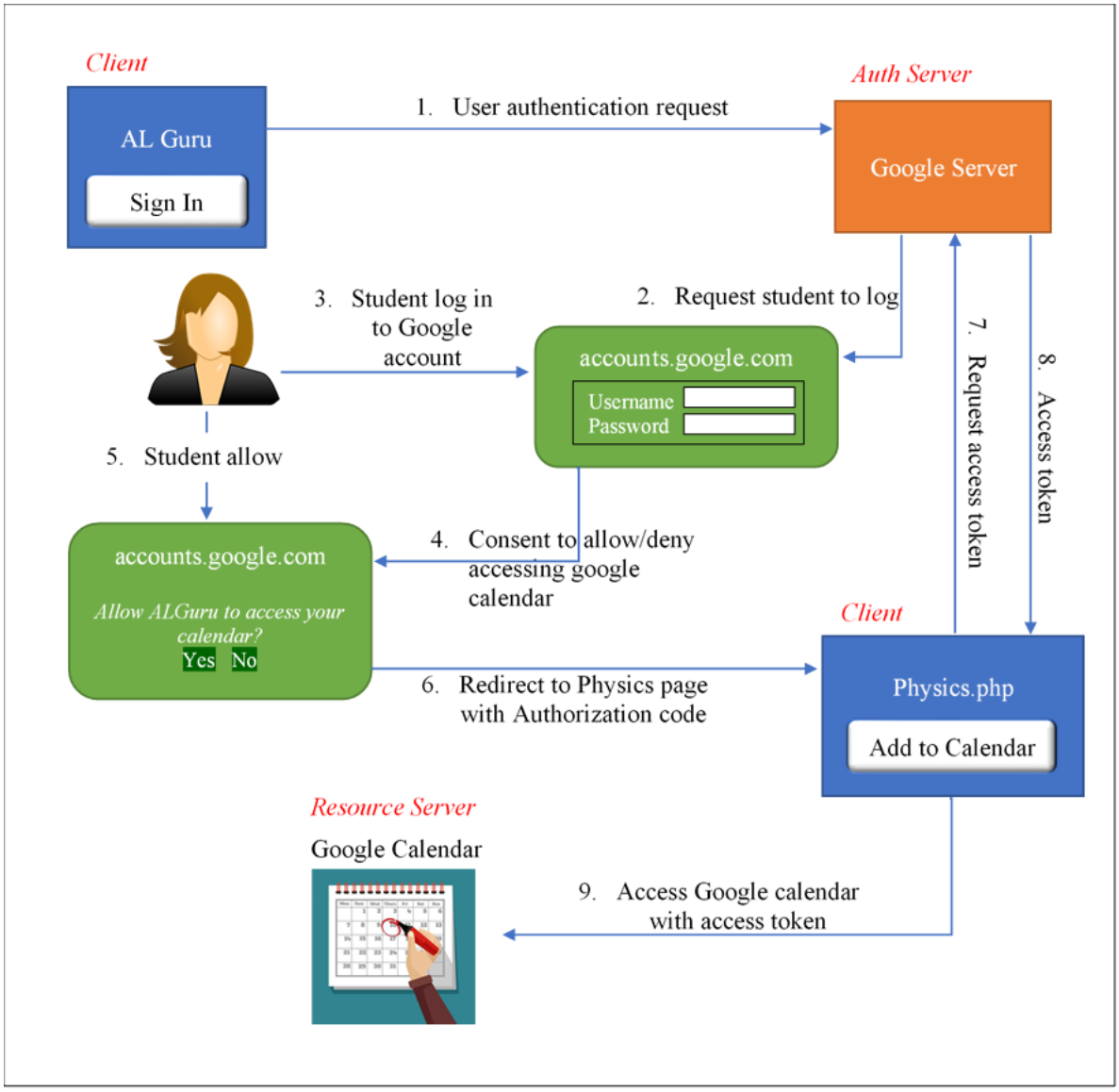

Figure 9 Authentication Code message flow

4.2 Message flows & grants Explained

The use case of this scenario, considering all the message flows and descriptions are stated below, step wise in order.

The Home page, where the AL student, clicks in the Physics subject.

1st step: The AL students will access the app, that's hosted on the web, and click on the necessary subject they wish to add a reminder. The AL students should click on the link, they'll have to sign in to the service

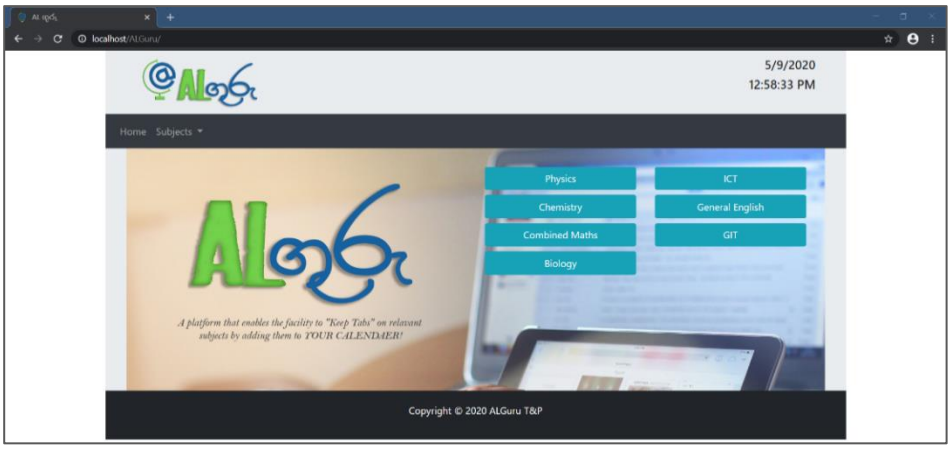

Figure 11 Home page

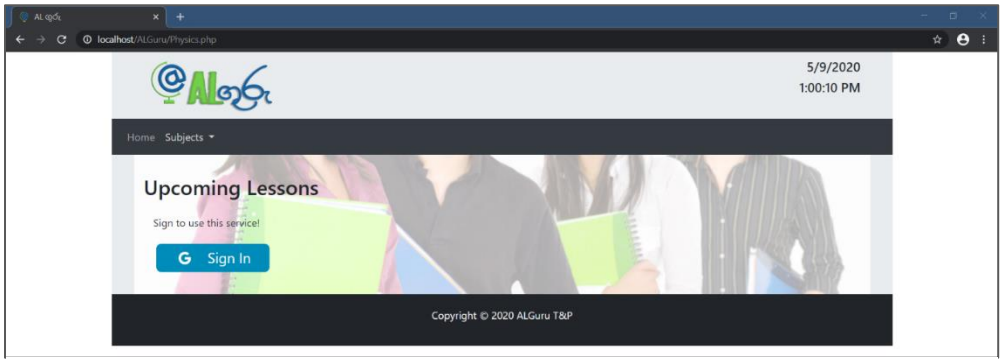

Figure 10 Request Sign In

2nd, 3rd step: If the student is not logged in, then they will have to sign in.

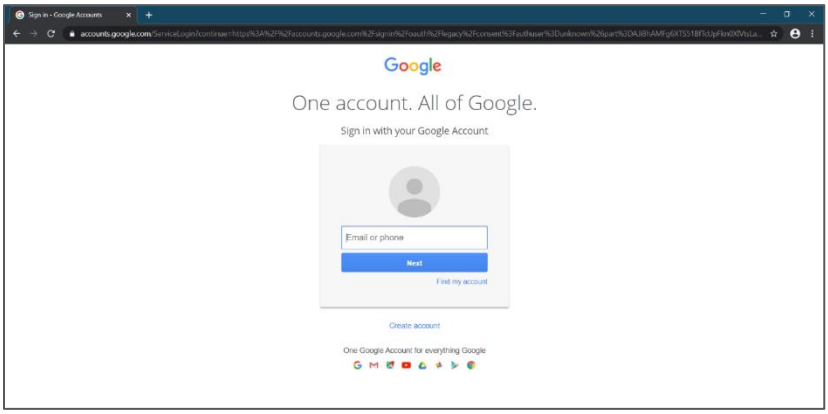

Figure 12 Google authorization

4th, 5th steps: Next, they can allow/ deny the service authorization from consent screen.

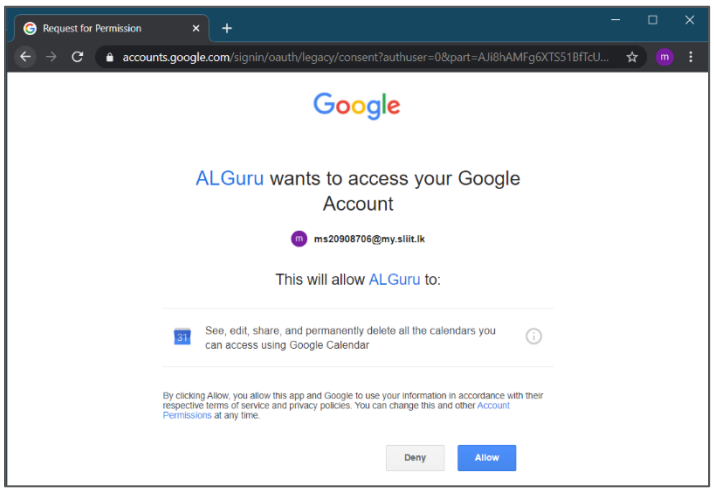

Figure 13 Google consent screen

6th step: When the student clicks on allow, the service redirects the web browser to the app redirect URI, which was detailed at the client registration, along with an authorization code. The redirect page, looks like as below.

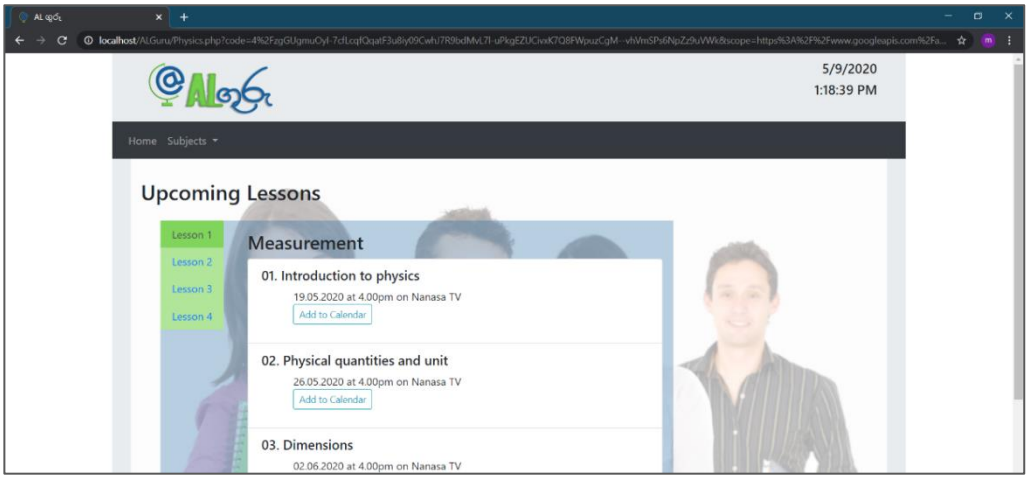

Figure 14 Redirecting page

7th step: The app then requests an access token from the API, sending the authorization code along with all the authentication details, which contains from the client secret, to the endpoint token of the API.

8th step: When the authorization is valid, the API will send an answer with the access token, a refresh token, optionally, to the application.

9th step: When the student clicks on "Add to calendar", the app will take the access token to the resource server – *Google calendar* & get permission to create the event.

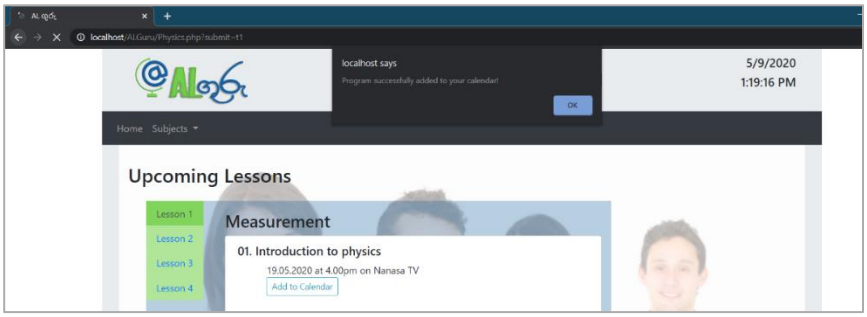

Figure 15 Creating event

The application authorization process is completed. The token is used in accessing the users account through the service API, in limitation of scope to access, until the token is modified, meaning its expiration or revoking. A refresh token exists, & could be used to demand new access tokens, after the expiration of the original.

This app contains an access token, & it can be used to access the students SLIIT accounts using API, in the limitation of the scope to access, until the token is modified, meaning its expiration or revoking. If the access token is invalid, the API will show an error.

5. Conclusions

AL ඉරු was implemented by consuming services of an OAuth Authorization Server and an OAuth Resource Server, attaining the access token, prompts user authentication, along the flow, & after receiving the OAuth access token, invokes the resource server APIs and gain the protected perform to add reminders in the calendar.
The process, of implementation was indeed a success, keeping aside some features, that will be in need of upgrading (mentioned in the recommendation).

6. Recommendations

Below specified are the "What needs to be done in the future" figures, in order of priority.

1. At the moment, this app is hosted in localhost, & it must be deployed to be hosted in WWW.
2. We have only made the Physics button functionality in OAuth, & the rest must follow.
3. User accounts are biased, only for *SLIIT Google* accounts, this can be loosening up.

We hope to improve and upgrade this application, for the benefit of our knowledge, & maybe to fill the void of such an application not been made still.

7. References

1. Google Developers. 2020. Using Oauth 2.0 For Web Server Applications | Google Identity Platform. [online] Available at: https://developers.google.com/identity/protocols/oauth2/web-server
2. "OAuth 2.0." *OAuth*, oauth.net/2/.
3. R. Sobers, "What is OAuth? Definition and How it Works," *Inside Out Security*, 31-Aug-2018. [Online]. Available: https://www.varonis.com/blog/what-is-oauth/.
4. https://developer.github.com/apps/building-oauth-apps/authorizing-oauth-apps/
5. "Calendar API | Google Developers," *Google*. [Online]. Available: https://developers.google.com/calendar.

APPENDIX

Index.php

```
<!doctype html>
<html lang="en">
  <head>
    <!-- Required meta tags -->
    <meta charset="utf-8">
    <meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-fit=no">
    <!-- Bootstrap CSS -->
    <link rel="stylesheet" href="css/bootstrap.min.css">
    <link rel="icon" type="image/png" href="images/icons/logo.png"/>
    <title>AL ගුරු</title>
  </head>
  <body style="margin:0 10%;padding:0 10px;">
       <div class="jumbotron jumbotron-fluid" style="padding-bottom:0px;padding-top:10px;margin-
bottom:0px;">
       <div class="container">
       <div class="row">
              <div class="col-sm-4">
                     <a href="index.php"><img class="img-fluid" src="images/logoM.png" /></a>
              </div>
             <!--display date and time-->
              <div class="col-sm-8">
                 <h5 class="text-right" id="date"></h5>
                 <h5 class="text-right"  id="time"></h5>
                 <script>
                 var dt = new Date();
                 document.getElementById("date").innerHTML = dt.toLocaleDateString();
                 document.getElementById("time").innerHTML = dt.toLocaleTimeString();
                 </script>
              </div>
              </div>
       </div>
       <!-- menu bar-->
       <?php include 'menu.php'; ?>
       <div class="container" style="padding:30px; background-image:
url(images/12.jpg);background-position: top;background-repeat: no-repeat;background-size:
cover;">
       <div class="row">
        <!-- logo and description-->
              <div class="col-sm-6">
                     <img class="img-fluid text-center" src="images/logoM2.png" />
              </div>
        <!--button area-->
        <div class="col-sm-3">
                     <a href="Physics.php" class="btn btn-info btn-block"
role="button">Physics</a>
                     <a href="Chemistry.php" class="btn btn-info btn-block"
role="button">Chemistry</a>
                     <a href="CombinedM.php" class="btn btn-info btn-block"
role="button">Combined Maths</a>
            <a href="Bio.php" class="btn btn-info btn-block" role="button">Biology</a>
       </div>
              <div class="col-sm-3">
             <a href="ICT.php" class="btn btn-info btn-block" role="button">ICT</a>
             <a href="GE.php" class="btn btn-info btn-block" role="button">General English</a>
             <a href="GIT.php" class="btn btn-info btn-block" role="button">GIT</a>
              </div>
       </div>
       </div>
       </div>
    <!-- footer -->
       <div class=" text-center" style="background-color:#212529;color:#ffffff;padding:20px 0;">
              <p>Copyright © 2020 ALGuru T&amp;amp;P</p>
       </div>
```

```
    <!-- Optional JavaScript -->
    <!-- jQuery first, then Popper.js, then Bootstrap JS -->
    <script src="https://code.jquery.com/jquery-3.3.1.slim.min.js" integrity="sha384-
q8i/X+965DzO0rT7abK41JStQIAqVgRVzpbzo5smXKp4YfRvH+8abtTE1Pi6jizo"
crossorigin="anonymous"></script>
    <script src="https://cdnjs.cloudflare.com/ajax/libs/popper.js/1.14.7/umd/popper.min.js"
integrity="sha384-UO2eT0CpHqdSJQ6hJty5KVphtPhzWj9WO1clHTMGa3JDZwrnQq4sF86dIHNDz0W1"
crossorigin="anonymous"></script>
    <script src="js/bootstrap.min.js"></script>
 </body>
</html>
```

Menu.php

```
<div style="padding-top:10px;">
       <nav class="navbar navbar-expand-sm bg-dark navbar-dark">
              <!-- Toggler/collapsibe Button -->
                  <button class="navbar-toggler" type="button" data-toggle="collapse" data-
target="#collapsibleNavbar">
                           <span class="navbar-toggler-icon"></span>
                  </button>
       <!-- Navbar links -->
       <div class="collapse navbar-collapse" id="collapsibleNavbar">
              <!-- Links -->
              <ul class="navbar-nav">
                     <li class="nav-item">
                            <a class="nav-link" href="index.php">Home</a>
                     </li>
                     <!-- Dropdown -->
                     <li class="nav-item dropdown">
                            <a class="nav-link dropdown-toggle" href="#" id="navbardrop1" data-
toggle="dropdown">Subjects</a>
                     <div class="dropdown-menu">
                            <a class="dropdown-item" href="Physics.php">Physics</a>
                            <a class="dropdown-item" href="Chemistry.php">Chemistry</a>
                            <a class="dropdown-item" href="CombinedM.php">Combined Maths</a>
                            <a class="dropdown-item" href="Bio.php">Biology</a>
                            <a class="dropdown-item" href="ICT.php">ICT</a>
                            <a class="dropdown-item" href="GE.php">General English</a>
                            <a class="dropdown-item" href="GIT.php">GIT</a>
                     </div>
                     </li>
            </ul>
       </div>
       </nav>
</div>
```

Physics.php

```
<!doctype html>
<html lang="en">
  <head>
    <!-- Required meta tags -->
    <meta charset="utf-8">
    <meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-fit=no">
    <!-- Bootstrap CSS -->
    <link rel="stylesheet" href="css/bootstrap.min.css">
      <link rel="stylesheet" href="css/tab.css">
       <link rel="icon" type="image/png" href="images/icons/logo.png"/>
    <title>AL ලබ්ධි</title>
  </head>
  <body style="margin:0 10%;padding:0 10px;">
       <div class="jumbotron jumbotron-fluid" style="padding-bottom:0px;padding-top:10px;margin-
bottom:0px;">
              <div class="container">
              <div class="row">
                     <div class="col-sm-4">
```

```
                    <a href="index.php"><img class="img-fluid" src="images/logoM.png" /></a>
                  </div>
                  <div class="col-sm-8">
                     <!--display date and time-->
                      <h5 class="text-right"  id="date"></h5>
                     <h5 class="text-right"  id="time"></h5>
                     <script>
                     var dt = new Date();
                     document.getElementById("date").innerHTML = dt.toLocaleDateString();
                     document.getElementById("time").innerHTML = dt.toLocaleTimeString();
                     </script>
                  </div>
            </div>
            </div>
            <!-- menu bar-->
            <?php include 'menu.php'; ?>
            <div class="container" style="padding:30px; background-image:
url(images/back6.jpg);background-position: center;background-repeat: no-repeat;background-size:
cover;">
       <div class="row mb-3">
         <!-- heading -->
         <h2 class="text-center">Upcoming Lessons</h2>
        </div>
       <div class="row">
          <div class="col-sm-9">
            <!-- check for the user login-->
                <?php include 'connection.php';?>
          </div>
         <div class="col-sm-3">
         </div>
       </div>
       </div>
    <!-- footer -->
       <div class=" text-center" style="background-color:#212529;color:#ffffff;padding:20px 0;">
             <p>Copyright © 2020 ALGuru T&amp;P</p>
       </div>
 </div>
    <!-- Optional JavaScript -->
    <!-- jQuery first, then Popper.js, then Bootstrap JS -->
    <script src="https://code.jquery.com/jquery-3.3.1.slim.min.js" integrity="sha384-
q8i/X+965DzO0rT7abK41JStQIAqVgRVzpbzo5smXKp4YfRvH+8abtTE1Pi6jizo"
crossorigin="anonymous"></script>
    <script src="https://ajax.googleapis.com/ajax/libs/jquery/3.3.1/jquery.min.js"></script>
    <script src="https://cdnjs.cloudflare.com/ajax/libs/popper.js/1.14.7/umd/popper.min.js"
integrity="sha384-UO2eT0CpHqdSJQ6hJty5KVphtPhzWj9WO1clHTMGa3JDZwrnQq4sF86dIHNDz0W1"
crossorigin="anonymous"></script>
    <script src="js/bootstrap.min.js"></script>
</body>
</html>
```

Connection.php

```
<link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/font-
awesome/4.7.0/css/font-awesome.min.css">
<style>
.button {
  display: inline-block;
  border-radius: 8px;
  background-color: #008CBA;
  border: none;
  color: #FFFFFF;
  text-align: center;
  font-size: 22px;
  padding: 5px 12px;
  width: 175px;
  transition: all 0.5s;
  cursor: pointer;
  margin: 5px;
}
```

```
.button span {
  cursor: pointer;
  display: inline-block;
  position: relative;
  transition: 0.5s;
}
.button span:after {
  content: '\00bb';
  position: absolute;
  opacity: 0;
  top: 0;
  right: -20px;
  transition: 0.5s;
}
.button:hover span {
  padding-right: 25px;
}
.button:hover span:after {
  opacity: 1;
  right: 0;
}
</style>
<?php
require __DIR__ . '/vendor/autoload.php';
/**
 * Returns an authorized API client.
 * @return Google_Client the authorized client object
 */
function getClient()
{
    $gClient = new Google_Client();
    $gClient->setApplicationName('ALGuru');
    $gClient->setScopes(Google_Service_Calendar::CALENDAR);
    $gClient->setAuthConfig('client_secret.json');
    $gClient->setAccessType('offline');
    $gClient->setPrompt('select_account consent');
    // Load previously authorized token from a file, if it exists.
    // The file token.json stores the user's access and refresh tokens, and is
    // created automatically when the authorization flow completes for the first
    // time.
    $userTokenPath = 'token.json';
    if (file_exists($userTokenPath)) {
        $appToken = json_decode(file_get_contents($userTokenPath), true);
        $gClient->setAccessToken($appToken);
    }
    // If there is no previous token or it's expired.
    if ($gClient->isAccessTokenExpired()) {
        // Refresh the token if possible, else fetch a new one.
        if ($gClient->getRefreshToken()) {
            $gClient->fetchAccessTokenWithRefreshToken($gClient->getRefreshToken());
        } else {
            // Request authorization from the user.
            if(!browserCredentials()) {
                $authUrl = $gClient->createAuthUrl();
                return "<p>Sign to use this service!</p><a href='$authUrl'><button
class='button' style='vertical-align:middle'><i class='fa fa-google' style='padding:0px 20px
5px 5px'></i><span> Sign In </span></button></a>";
            }
            $authCode = $_GET['code'];
            // Exchange authorization code for an access token.
            $appToken = $gClient->fetchAccessTokenWithAuthCode($authCode);
            $gClient->setAccessToken($appToken);
            // Check to see if there was an error.
            if (array_key_exists('error', $appToken)) {
                throw new Exception(join(', ', $appToken));
            }
        }
        // Save the token to a file.
        if (!file_exists(dirname($userTokenPath))) {
            mkdir(dirname($userTokenPath), 0700, true);
```

```
        }
        file_put_contents($userTokenPath, json_encode($gClient->getAccessToken()));
    }
    return $gClient;
}
//check browser url has the auth code
function browserCredentials() {
    if(isset($_GET['code'])) return true;
    return false;
}
//get authorized API client
$gClient = getClient();
if(! is_a ($gClient, "Google_Client")) {
        echo $gClient;
}
else {
            //dispaly the content of physics page
           include 'content.php';
}
?>
```

Content.php

```
<div class="container">
          <ul class="nav nav-tabs" id="myTab" role="tablist">
          <li class="nav-item">
            <a class="nav-link active" data-toggle="tab" href="#l1" role="tab" aria-
controls="l1">Lesson 1</a>
          </li>
          <li class="nav-item">
            <a class="nav-link" data-toggle="tab" href="#l2" role="tab" aria-
controls="l2">Lesson 2</a>
          </li>
          <li class="nav-item">
            <a class="nav-link" data-toggle="tab" href="#l3" role="tab" aria-
controls="l3">Lesson 3</a>
          </li>
          <li class="nav-item">
            <a class="nav-link" data-toggle="tab" href="#l4" role="tab" aria-
controls="l4">Lesson 4</a>
          </li>
        </ul>
       <div class="tab-content">
          <div class="tab-pane active p-3" id="l1" role="tabpanel">
            <h3>Measurement</h3>
             <ul class="list-group">
              <li class="list-group-item">
                   <h5 class="list-group-item-heading">01. Introduction to physics</h5>
                    <p class="list-group-item-text pl-5">19.05.2020 at 4.00pm on Nanasa TV<br>
                       <button id="submit" name="submit" type="button" class="btn btn-outline-
info btn-sm" onclick='location.href="?submit=t1"'>Add to Calendar</button>
                    </p>
             </li>
             <li class="list-group-item">
                 <h5 class="list-group-item-heading">02. Physical quantities and unit</h5>
                    <p class="list-group-item-text pl-5">26.05.2020 at 4.00pm on Nanasa TV<br>
                        <button id="submit" name="submit" type="button" class="btn btn-outline-
info btn-sm" onclick='location.href="?submit=t2"'>Add to Calendar</button>
                    </p>
                 </li>
              <li class="list-group-item">
                 <h5 class="list-group-item-heading">03. Dimensions</h5>
                    <p class="list-group-item-text pl-5">02.06.2020 at 4.00pm on Nanasa TV<br>
                       <button id="submit" name="submit" type="button" class="btn btn-outline-
info btn-sm" onclick='location.href="?submit=t3"'>Add to Calendar</button>
                    </p>
              </li>
              <li class="list-group-item">
                 <h5 class="list-group-item-heading">04. Measuring instrumen</h5>
```

```
                    <p class="list-group-item-text pl-5">09.06.2020 at 4.00pm on Nanasa TV<br>
                       <button id="submit" name="submit" type="button" class="btn btn-outline-
info btn-sm" onclick='location.href="?submit=t4"'>Add to Calendar</button>
                    </p>
                </li>
                <li class="list-group-item">
                  <h5 class="list-group-item-heading">05. Scalars and vectors</h5>
                    <p class="list-group-item-text pl-5">16.06.2020 at 4.00pm on Nanasa TV<br>
                        <button id="submit" name="submit" type="button" class="btn btn-outline-
info btn-sm" onclick='location.href="?submit=t5"'>Add to Calendar</button>
                    </p>
                </li>
              </ul>
        </div>
          <div class="tab-pane p-3" id="l2" role="tabpanel">
               <h3>Mechanics</h3>
                <ul class="list-group">
                  <li class="list-group-item">01. Kinematics</li>
                  <li class="list-group-item">02. Resultant force and moment of force</li>
                  <li class="list-group-item">03. Force and motion</li>
                  <li class="list-group-item">04. Equilibrium</li>
                  <li class="list-group-item">05. Work, energy and power</li>
                  <li class="list-group-item">06. Rotational motion</li>
                  <li class="list-group-item">07. Fluid-dynamics</li>
              </ul>
          </div>
          <div class="tab-pane p-3" id="l3" role="tabpanel">
              <h3>Oscillations and Wave</h3>
               <ul class="list-group">
                   <li class="list-group-item">01. NYA</li>
                   <li class="list-group-item">02. NYA</li>
                   <li class="list-group-item">03. NYA</li>
                   <li class="list-group-item">04. NYA</li>
                   <li class="list-group-item">05. NYA</li>
                   <li class="list-group-item">06. NYA</li>
                   <li class="list-group-item">07. NYA</li>
                </ul>
            </div>
          <div class="tab-pane p-3" id="l4" role="tabpanel">
              <h3>Thermal Physics</h3>
               <ul class="list-group">
                   <li class="list-group-item">01. NYA</li>
                   <li class="list-group-item">02. NYA</li>
                   <li class="list-group-item">03. NYA</li>
                   <li class="list-group-item">04. NYA</li>
                   <li class="list-group-item">05. NYA</li>
                   <li class="list-group-item">06. NYA</li>
                   <li class="list-group-item">07. NYA</li>
                </ul>
         </div>
        </div>
       </div>
<?php
    if($_GET){
        include 'schedules.php';
        if(isset($_GET['submit'])){

           $req = $_GET['submit'];
            switch ($req) {
                case 't1':
                    u1v1();
                    break;
                case 't2':
                    u1v2();
                    break;
                case 't3':
                    u1v3();
                    break;
                case 't4':
                    u1v4();
```

```
                    break;
                case 't5':
                    u1v5();
                    break;
                default:
                    echo "Error!";
            }
        }
    }
?>
```

Calendar.php

```
<?php
       require __DIR__ . '/vendor/autoload.php';
       $gClient = getClient();
       $gService = new Google_Service_Calendar($gClient);
       $gEvent = new Google_Service_Calendar_Event(array(
           'summary' => $summary ,
           'description' => $description ,
           'start' => array(
             'dateTime' => $start ,
             'timeZone' => 'Asia/Colombo',
           ),
           'end' => array(
             'dateTime' => $end ,
             'timeZone' => 'Asia/Colombo',
           ),
           'reminders' => array(
             'useDefault' => FALSE,
             'overrides' => array(
               array('method' => 'email', 'minutes' => 24 * 60),
               array('method' => 'popup', 'minutes' => 15),
             ),
           ),
       ));
        $gCalendarId = 'primary';
        $gEvent = $gService->events->insert($gCalendarId, $gEvent);
        echo '<script type="text/javascript">';
        echo ' alert("Program is successfully added to your calendar!");';
        echo 'window.location.href = "http://localhost/ALGuru/physics.php";';
        echo '</script>';
?>
```

Schedules.php

```
<?php
     function u1v1(){
         $summary = '01. Introduction to physics';
         $description = 'Nanasa TV';
         $start = '2020-05-19T16:00:00+05:30';
         $end = '2020-05-19T18:00:00+05:30';
         include 'calendar.php';
     }

     function u1v2(){
         $summary = '02. Physical quantities and unit';
         $description = 'Nanasa TV';
         $start = '2020-05-26T16:00:00+05:30';
         $end = '2020-05-26T18:00:00+05:30';
         include 'calendar.php';
     }

     function u1v3(){
         $summary = '03. Dimensions';
         $description = 'Nanasa TV';
         $start = '2020-06-02T16:00:00+05:30';
         $end = '2020-06-02T18:00:00+05:30';
         include 'calendar.php';
```

```
    }

    function u1v4(){
        $summary = '04. Measuring instrumen';
        $description = 'Nanasa TV';
        $start = '2020-06-09T16:00:00+05:30';
        $end = '2020-06-09T18:00:00+05:30';
        include 'calendar.php';
    }

    function u1v5(){
        $summary = '05. Scalars and vectors';
        $description = 'Nanasa TV';
        $start = '2020-06-16T16:00:00+05:30';
        $end = '2020-06-16T18:00:00+05:30';
        include 'calendar.php';
    }

?>
```