CLASSROOM BOOKING SERVICE
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General Description: For our project, we wanted to create a classroom scheduler that is accessible through a web application that would allow students to reserve classrooms for their choice of use – such as for studying, or perhaps hosting a club event, or even simply watching a movie. For each available classroom, we've included a few notable attributes that would potentially help a user find a classroom to fit their needs. For example, if a student wanted to book a classroom to work on a large computer science project, one desired attribute of the room would be a large number of available outlets (since computer science students will probably want to work on laptops, and laptops need charging). Or, perhaps, if a student wanted to book a room in order to screen a movie, one requirement of the room would be the presence of a projector.

We've included the following properties as attributes of rooms so that rooms are filterable by these properties: the building of the room, the room number, the presence of a projector, the type of board in the classroom, whether or not there is a visualizer[1], the number of outlets in the room, and the capacity of the room. These are attributes that we feel would be most desirable to know when choosing a room for a given purpose. The building of a room would be a geographical indicator, such that if students were trying to meet for a project, they could choose a building that is best suited to everyone distance-wise. The projector and capacity of the room would be beneficial to know if a student were trying to reserve a room for a large meeting. The room number indicates the floor that a given classroom is on, so that if the students wanted to avoid walking up many flights of stairs, they could reserve a room on the basement or first floor.

We've also included attributes that we feel would be beneficial to professors, such as whether there is a visualizer in the room and what kind of board (be it whiteboard, chalkboard, or both) the classroom has. The primary reason for including these two attributes is because we wanted to open up the option of scheduling classrooms to professors as well, and professors will most often use a visualizer or the board for lecturing (of course, students are free to specify their desire for a visualizer or a specific type of board as well—we just felt these properties would be less important to students). Specifically, we wanted to give professors the opportunity to request a classroom for a semester, given they have their designated class time. They would be able to request a room directly, by inputting a specific building and room number in conjunction with their class's time slot, or by simply specifying their time slot and requesting a combination of their desired attributes, such as the minimum capacity of the room or that the board in the room be a chalkboard[2]. The requests would then be run through a scheduler algorithm to

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[1] We just wished to clarify—because we didn't know what it was called prior to looking it up for this project—that a visualizer is the camera / projector equipment that is used in class for projecting written notes onto the screen.

[2] We have heard numerous math professors specify a preference for chalkboards—hence the inclusion of board type.

satisfy as many requests as possible, with certain attributes being given more weight than others[3]. Of course, the scheduling of classes would be handled prior to the start of the semester so that there would not be any conflicts with students reserving classrooms during designated class times. However, if a professor were to potentially cancel a class, s/he would have the option of cancelling that class's reservation for a given day, opening up the time slot to students.

Database Design: Below, we provide the ER diagram for our database, as well as our final schemas and their justification.
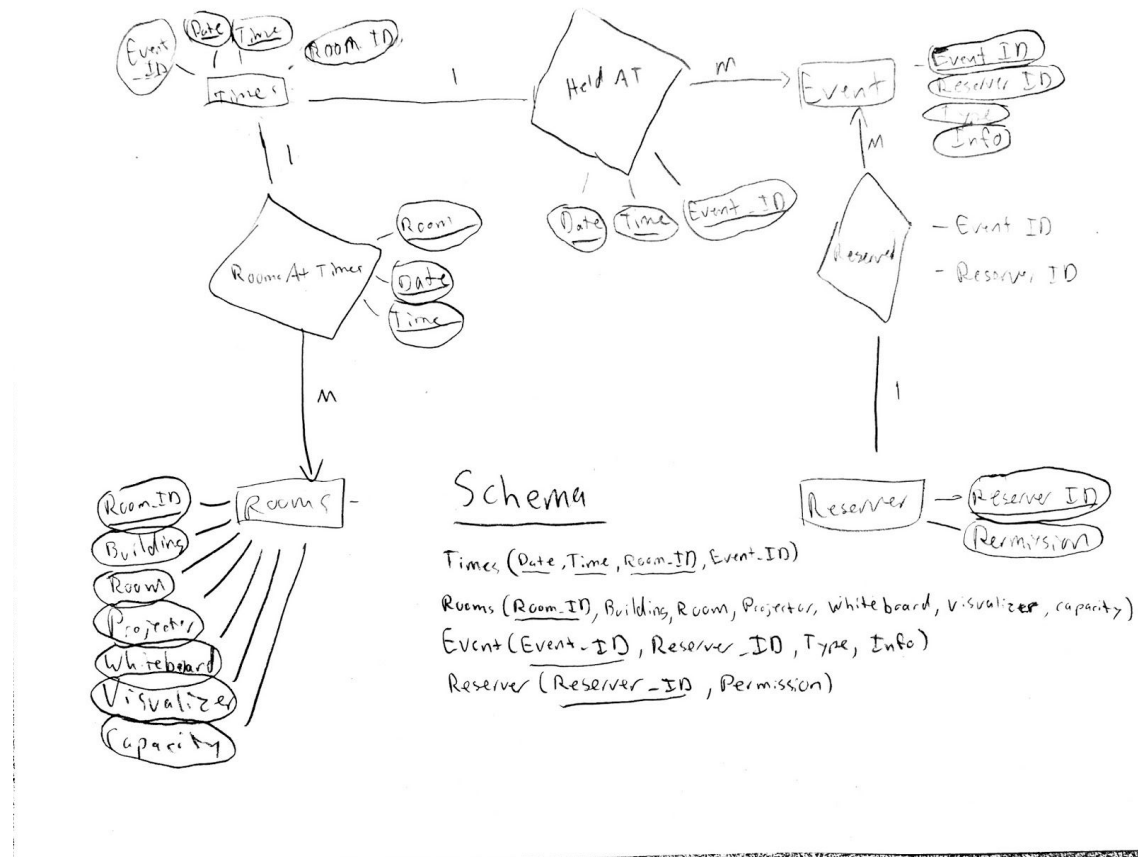
To be in BCNF, all non-trivial FD's of a schema must have the left side be a superkey while the right side does not contain a key. The non-trivial FDs of our schema are:
(Date, Time, Room_ID)->(Event_ID)
     for R(Date,Time,Room_ID,Event_ID)
(Room_ID)->(Building, Room, Projector, Whiteboard, Visualizer, Capacity)
     for R(Room_ID,Building, Room, Projector, Whiteboard, Visualizer, Capacity)
(Event_ID)->(Reserver_ID,Type,Info)
     for R(Event_ID,Reserver_ID,Type,Info)
(Reserver_ID)->(Permission)
     for R(Reserver_ID, Permission)

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[3] We provide the details of this algorithm in the Notables section.

As can be seen, each left side of a non-trivial FD is a superkey for the relation; therefore our schema is in BCNF.

Database Implementation: The following DDL statements were used to create the tables for our database based on the schemas given in the previous section.

<u>ROOMS:</u>
```
create table Rooms
    (      Room_ID              varchar(30)    not null unique,
           Building             varchar(10)    not null,
           Room_Number          varchar(10)    not null,
           Projector            varchar(10)    ,
           Whiteboard           varchar(10)    ,
           Visualizer           varchar(10)    ,
           Outlets              int            ,
           Capacity             int            not null,
           primary key(Room_ID));
```
<u>RESERVER</u>
```
create table Reserver
    (      Reserver_ID   int           not null unique,
           Permission    int           not null,
           primary key(Reserver_ID));
```
<u>EVENT</u>
```
create table Event
    (      Event_ID     int           not null unique,
           Reserver_ID  int           not null,
           Type         varchar(15)   not null,
           Info         varchar(100)  ,
           primary key(Event_ID),
           foreign key(Reserver_ID) references Reserver(Reserver_ID));
```
<u>TIMES</u>
```
create table Times
    (    Date         varchar(10)            not null,
         Time         varchar(6)             not null,
         Room_ID      varchar(30)            not null CHECK(Room_ID in
Select(Room_ID from Rooms),
         Event_ID     int            ,
         primary key(Date, Time, Room_ID),
         foreign key(Room_ID) references Rooms(Room_ID),
         foreign key(Event_ID) references Event(Event_ID));
```
<u>BACKUPS</u>
TimesCopy and TimesBackup are the same schema as Times.
EventCopy and EventBack are the same schema as Event.

We found the majority of the source of our data online. Particularly, we obtained a list of available classrooms used by the scheduling office with their respective capacity numbers

from this form:
http://www.wm.edu/offices/studentleadershipdevelopment/documents/classroom%20upd
ate.pdf

We made the assumption that only the classrooms listed at the above link were available
to be scheduled and generated our rooms table from only that list.

To obtain the list of classes used in both the current scheduled events, as well as in the
demonstration of the scheduler algorithm, we downloaded the HTML files of the full
course listing on Banner for the current semester and parsed them with Python scripts.
We treated any listings with placeholder text as invalid.

The Reserver table is populated solely by user input and a special administrative user,
user 0. Because this table functions solely to store information, we felt it unnessary to
generate synthetic data, but we do show the connection between Reserver and Times
through our application and using the Reserver Id to schedule time slots.

The Event and Times tables both have backups as well as a blank copy of the table for
use in our scheduling algorithm. The TimesCopy and TimesBackup tables consist of a
copy of the data from Times but without any event_ids. The EventCopy and
EventBackup tables are both empty, but have the same schema as Event. Because these
copied tables share schema with the table they copy, we thought it unnecessary to include
them in our Design section.

Application Interface: Users can interact with our booking system through our web
interface. The web interface is written in HTML5, CSS, and PHP. The web interface is
highly mobile-friendly, and will automatically adjust the page layout according to the
size the device screen.

The user can search for the classroom he or she wants to reserve either by directly typing
the building name and the room number of the classroom that he or she has in mind, or
search for a room according to the features he or she wants to have in the room.

If the user knows which room he wants to reserve, he could click the "Search by
Classrooms" tab on the page. A table of all the classrooms that one can reserve through
our system will show up. The user can type the building name and/or room number in the
text field above table to search for a particular room. Search results will be displayed as
the user types. The row which the user is pointing at will be highlighted to help
navigation.

If the user would like to search for a classroom that fits his needs, he could click "Search
by Features" tab on the page. The user can specify if he needs projectors or visualizers,
what kind of board he needs, and the minimum number of power outlets and capacity he
needs for his event. Only numbers are accepted in the outlets and capacity fields. There
are two small arrows next to the input field for the user to adjust the number he put in.

Once the user clicks on the classroom, a table of the availability of that particular classroom throughout that week will be displayed. A green cell indicates that the room is free during that time block, while a red cell indicates that the room is busy. Time blocks are displayed from 08:00 to 21:00 (09:00 PM) with a step of 30 minutes. This is the time interval that one is able to reserve through our system. The cell that the user is pointing to will be highlighted. The user can check the boxes in the green cells to select those time blocks. Then, the user has to put in a title for his event, and his 930 student ID number to confirm the booking. A confirmation message, which includes the user's ID number, the room number, the event title with a sequence number, and the time and date of the booking, will display if the booking is successful.

In the "Confirmed Reservations" tab, we lists all the bookings submitted by students, with corresponding event titles, sequence numbers, and classifications. The user can cancel one event by clicking the link in the "Action" column. The user would be asked to provide the student ID number of whomever submitted that booking request in order to cancel it. This is a simple verification step to prevent students from cancelling someone else's bookings. A confirmation message will display if the user passed the verification. Otherwise, an error message will display.

Notables: For our notables, we'd like to first highlight the creative graphic implementation in the top left corner of our interface. If a user hovers their mouse pointer over the eye in the top left corner, it will blink. Hence, we decided on the name 'CBS' and the logo of an eye[4].

The second notable item is our scheduling algorithm for professor requests. The process first assumes an initially blank Times table (in our database as TimesCopy), as scheduling classes is assumed to only be done once per semester. The process is given below:

1. Professors input their requests through the web interface.
2. Once all of the requests are input into the web form, a user with admin permission level can click a 'submit' button, in which case the web interface will generate a text file with a line of formatted text for each submitted request.
3. The PHP will then execute a python script that uses psycopg2 to connect to the database to query potential room matches and then commit the requested changes to the database.
4. The logic of the scheduling algorithm proceeds as follows:
    a. Create an overall list of all the requests.
    b. Create a dictionary of all the requests that ask for a specific room.
    c. In the dictionary of specific room requests, find all the rooms in which there is only a single request for that room, and grant the requests for those

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[4] We are in no way affiliated with Columbia Broadcasting System or the CBS Corporation.

rooms. (The logic here is that if there is only a single request for a given room, then there are no possible time overlaps for that room.) Remove those requests from the list of overall requests.

d. Of the remaining specific room requests, order the requests by starting time. Then, iterate over the ordered requests, and if the end time of the current class does not overlap with the start time of the next class, grant the request of the current class and continue on iterating, comparing current class times with the next sequential class time. If the end time of the current class overlaps with the beginning time of the next class, then grant the request for the current class (the earlier of the overlap), and increase the next class value until the next class without an overlap is found. Reset the current class to the next class without an overlap and restart the iteration from that point onwards. Remove all granted requests from the list of all requests (created in step a).

e. For the remainder of the room requests in the list of all requests, query the database for the rooms with the given attributes that have available time slots. If no tuples are returned, as in no rooms with the given attributes have available time slots, remove the least weighted attribute and requery the database. Repeat until a suitable room in the given time slot is found.

f. The attributes are listed from most important weight to least important weight below:

    1. capacity
    2. projector
    3. visualizer
    4. outlets
    5. building
    6. room number
    7. outlets

Appendix A: application code
admin-login.html:

```html
<!DOCTYPE html>
<html>
    <head>
            <meta content="text/html;charset=utf-8"
http-equiv="Content-Type">
            <meta content="utf-8" http-equiv="encoding">
            <title>CS421 Database G11 Project "Class Booking
Service"</title>
        <meta name="Author" content="Yangyang He">
        <meta content="width=device-width,initial-scale=1"
name=viewport>
        <!-- Latest compiled and minified CSS -->
        <link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/css/boots
trap.min.css"
integrity="sha384-BVYiiSIFeK1dGmJRAkycuHAHRg32OmUcww7on3RYdg4Va
+PmSTsz/K68vbdEjh4u" crossorigin="anonymous">
        <link rel="stylesheet" href="assets/css/main.css">
        <script
src="http://code.jquery.com/jquery-1.9.1.js"></script>
        <script
src="http://ajax.googleapis.com/ajax/libs/jquery/1.10.2/jquery.
min.js"></script>

        <script
src="http://netdna.bootstrapcdn.com/bootstrap/3.0.0/js/bootstra
p.min.js"></script>
        <script
src="http://code.jquery.com/ui/1.10.3/jquery-ui.js"></script>
    </head>
    <body>
          <div id="header">
        <!--Puts logo into Bootstrap grid so that it properly
resizes across devices-->
        <div class="container">
          <div class="row">
            <div class="col-sm-4" id="logo"><a
href="home.html"><div id="logo-img"></div></a></div>
            <div class="col-sm-4"></div>
            <div class="col-sm-4"></div>
          </div>
        </div>

        <!-- Static navbar -->
        <!-- HTML for the navigation bar - will collapse into
```

```html
a dropdown button on small screens-->
          <div class="navbar navbar-inverse navbar-static-top">
            <div class="container">
              <div class="navbar-header">
                <button type="button" class="navbar-toggle"
data-toggle="collapse" data-target=".navbar-collapse">
                  <span class="icon-bar"></span>
                  <span class="icon-bar"></span>
                  <span class="icon-bar"></span>
                </button>
              </div>
              <div class="navbar-collapse collapse">
                <ul class="nav navbar-nav navbar-left">
                  <li><a href="home.html">Home</a></li>
                  <li><a href="classrooms.php">Search by
Classrooms</a></li>
                  <li><a href="features.php">Search by
Features</a></li>
                  <li><a href="events.php">Confirmed
Reservations</a></li>
                  <li><a href="schedule.php">Schedule a
class</a></li>
                </ul>
              </div><!--/.nav-collapse -->
            </div>
          </div>
        </div> <!--end Header-->

          <div class="container">
                <div class="row">
                    <div class="col-md-12" id="middle">
          <form action="admin.php" method="post">
            <strong class="input-label">Admin Password:<span
style="color: red;">*</span> </strong>
            <input type="password" name="psw">
            <input type="submit" name="submit" value="Login">
          </form>
                    </div>
                </div>
            </div>
      </body>
</html>
```

admin.php:

```
<!DOCTYPE html>
<html>
      <head>
            <meta content="text/html;charset=utf-8"
http-equiv="Content-Type">
            <meta content="utf-8" http-equiv="encoding">
            <title>CS421 Database G11 Project "Class Booking
Service"</title>
        <meta name="Author" content="Yangyang He">
        <meta content="width=device-width,initial-scale=1"
name=viewport>
        <!-- Latest compiled and minified CSS -->
        <link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/css/boots
trap.min.css"
integrity="sha384-BVYiiSIFeK1dGmJRAkycuHAHRg32OmUcww7on3RYdg4Va
+PmSTsz/K68vbdEjh4u" crossorigin="anonymous">
        <link rel="stylesheet" href="assets/css/main.css">
        <script
src="http://code.jquery.com/jquery-1.9.1.js"></script>
        <script
src="http://ajax.googleapis.com/ajax/libs/jquery/1.10.2/jquery.
min.js"></script>

        <script
src="http://netdna.bootstrapcdn.com/bootstrap/3.0.0/js/bootstra
p.min.js"></script>
        <script
src="http://code.jquery.com/ui/1.10.3/jquery-ui.js"></script>
      </head>
      <body>
           <div id="header">
          <!--Puts logo into Bootstrap grid so that it properly
resizes across devices-->
          <div class="container">
            <div class="row">
              <div class="col-sm-4" id="logo"><a
href="home.html"><div id="logo-img"></div></a></div>
              <div class="col-sm-4"></div>
              <div class="col-sm-4"></div>
            </div>
          </div>

          <!-- Static navbar -->
          <!-- HTML for the navigation bar - will collapse into
a dropdown button on small screens-->
          <div class="navbar navbar-inverse navbar-static-top">
```

```html
        <div class="container">
          <div class="navbar-header">
            <button type="button" class="navbar-toggle"
data-toggle="collapse" data-target=".navbar-collapse">
              <span class="icon-bar"></span>
              <span class="icon-bar"></span>
              <span class="icon-bar"></span>
            </button>
          </div>
          <div class="navbar-collapse collapse">
            <ul class="nav navbar-nav navbar-left">
              <li><a href="home.html">Home</a></li>
              <li><a href="classrooms.php">Search by
Classrooms</a></li>
              <li><a href="features.php">Search by
Features</a></li>
              <li><a href="events.php">Confirmed
Reservations</a></li>
              <li><a href="schedule.php">Schedule a
class</a></li>
            </ul>
          </div><!--/.nav-collapse -->
        </div>
      </div>
    </div> <!--end Header-->

        <div class="container">
            <div class="row">
                <div class="col-md-12" id="middle">
        <?php
          if ($_POST['psw'] == '0000'){
            echo "<h3>Administrator options</h3>\n";
            echo "<h4><a href='run-schedule.php'>Run schedule
script</a></h4>";
          } else {
            echo "<h4 style='color: red;'>Verification
failed. You do not have access to this page.</h4>";
          }
        ?>
                </div>
            </div>
        </div>
    </body>
</html>
```

booking.php:

```
<!DOCTYPE html>

<html lang="en">
<head>
  <title>CS421 Database G11 Project "Class Booking
Service"</title>
  <meta name="Author" content="Yangyang He">
  <meta content="width=device-width,initial-scale=1"
name=viewport>
  <!-- Latest compiled and minified CSS -->
  <link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/css/boots
trap.min.css"
integrity="sha384-BVYiiSIFeK1dGmJRAkycuHAHRg32OmUcww7on3RYdg4Va
+PmSTsz/K68vbdEjh4u" crossorigin="anonymous">
  <link rel="stylesheet" href="assets/css/main.css">
  <script
src="http://code.jquery.com/jquery-1.9.1.js"></script>
  <script
src="http://ajax.googleapis.com/ajax/libs/jquery/1.10.2/jquery.
min.js"></script>

  <script
src="http://netdna.bootstrapcdn.com/bootstrap/3.0.0/js/bootstra
p.min.js"></script>
  <script
src="http://code.jquery.com/ui/1.10.3/jquery-ui.js"></script>
</head>
<body>
  <div id="header">

    <!--Puts logo into Bootstrap grid so that it properly
resizes across devices-->
    <div class="container">
      <div class="row">
        <div class="col-sm-4" id="logo"><a
href="home.html"><div id="logo-img"></div></a></div>
        <div class="col-sm-4"></div>
        <div class="col-sm-4"></div>
      </div>
    </div>

    <!-- Static navbar -->
    <!-- HTML for the navigation bar - will collapse into a
dropdown button on small screens-->
    <div class="navbar navbar-inverse navbar-static-top">
      <div class="container">
```

```
        <div class="navbar-header">
          <button type="button" class="navbar-toggle"
data-toggle="collapse" data-target=".navbar-collapse">
            <span class="icon-bar"></span>
            <span class="icon-bar"></span>
            <span class="icon-bar"></span>
          </button>
        </div>
        <div class="navbar-collapse collapse">
          <ul class="nav navbar-nav navbar-left">
            <li><a href="home.html">Home</a></li>
            <li><a href="classrooms.php">Search by
Classrooms</a></li>
            <li><a href="features.php">Search by
Features</a></li>
            <li><a href="events.php">Confirmed
Reservations</a></li>
            <li><a href="schedule.php">Schedule a
class</a></li>
          </ul>
        </div><!--/.nav-collapse -->
      </div>
    </div>
  </div> <!--end Header-->
  <div id="body">
    <div class="container">
      <div class="row">
        <div class="col-md-12">
          <h3>Availability for <?php echo $_GET['room'] ?>:
</h3>
          <form action="confirmation.php" method="post">
            <div class="row" style="overflow-x:auto;">
              <table>
                <tr>
                  <th id='date-cell'>Time</th>
                  <th id='date-cell'>08:00</th>
                  <th id='date-cell'>08:30</th>
                  <th id='date-cell'>09:00</th>
                  <th id='date-cell'>09:30</th>
                  <th id='date-cell'>10:00</th>
                  <th id='date-cell'>10:30</th>
                  <th id='date-cell'>11:00</th>
                  <th id='date-cell'>11:30</th>
                  <th id='date-cell'>12:00</th>
                  <th id='date-cell'>12:30</th>
                  <th id='date-cell'>13:00</th>
                  <th id='date-cell'>13:30</th>
                  <th id='date-cell'>14:00</th>
```

```
                        <th id='date-cell'>14:30</th>
                        <th id='date-cell'>15:00</th>
                        <th id='date-cell'>15:30</th>
                        <th id='date-cell'>16:00</th>
                        <th id='date-cell'>16:30</th>
                        <th id='date-cell'>17:00</th>
                        <th id='date-cell'>17:30</th>
                        <th id='date-cell'>18:00</th>
                        <th id='date-cell'>18:30</th>
                        <th id='date-cell'>19:00</th>
                        <th id='date-cell'>19:30</th>
                        <th id='date-cell'>20:00</th>
                        <th id='date-cell'>20:30</th>
                </tr>
                <?php
                    // Connecting, selecting database
                    $dbconn = pg_connect("host=db.cs.wm.edu
dbname=swyao_CBS user=nswhay password=nswhay")
                     or die('Could not connect:' .
pg_last_error());
                    $sql = "SELECT event_id FROM times WHERE
room_id='";
                    $sql .= $_GET["room"];
                    $sql .= "' AND (date >= '2017-04-17' AND date
<= '2017-04-21') ORDER BY date, time;";
                    $result = pg_query($sql) or die('Query
failed: ' . pg_last_error());
                    $count = 0;
                    $day = 1;
                    while ($line = pg_fetch_array($result, null,
PGSQL_NUM)) {
                        if ($count % 26 == 0) {
                          switch ($day) {
                            case 1:
                              echo "\t<tr>\n\t\t<td
id='date-cell'>Monday</td>";
                                  break;
                            case 2:
                              echo "\t<tr>\n\t\t<td
id='date-cell'>Tuesday</td>";
                                  break;
                            case 3:
                              echo "\t<tr>\n\t\t<td
id='date-cell'>Wednesday</td>";
                                  break;
                            case 4:
                              echo "\t<tr>\n\t\t<td
id='date-cell'>Thursday</td>";
```

```php
                        break;
                    case 5:
                        echo "\t<tr>\n\t\t<td
id='date-cell'>Friday</td>";
                        break;
                }
                $day += 1;
            }
            if ($line[0]) {
                echo "\t\t<td
id='time-cell-busy'></td>\n";
            } else {
                echo "\t\t<td id='time-cell-free'><input
type='checkbox' name='time_list[]' value='$count'></td>";
            }
            $count += 1;
            if ($count % 26 == 0) {
                echo "\t</tr>\n";
            }
        }
    ?>
    </table>
</div>
<div class="row">
    <h5><span style="color:
rgb(34,177,76)">Green</span> = Free; <span style="color:
rgb(223,0,60)">Red</span> = Busy.</h5>
    <input type="hidden" name="room" value="<?php
echo htmlspecialchars($_GET['room']) ?>">
    <strong class="input-label">Give your reservation
a name (this will be public):<span style="color: red;">*</span>
</strong>
    <input type="text" name="info">
    <br>
    <strong class="input-label">Your student ID
number (930):<span style="color: red;">*</span> </strong>
    <input type="number" name="reserver_id" min="0">
    <br>
    <input type="submit" name="submit" value="Submit
my booking request">
</div>
        </form>
    </div>
  </div>

    </div>
  </div>
</body>
```

```php
<?php
// Free resultset
pg_free_result($result);

// Closing connection
pg_close($dbconn);
?>
</html>
```

cancel-confirmation.php:

```
<!DOCTYPE html>

<html lang="en">
<head>
  <title>CS421 Database G11 Project "Class Booking
Service"</title>
  <meta name="Author" content="Yangyang He">
  <meta content="width=device-width,initial-scale=1"
name=viewport>
  <!-- Latest compiled and minified CSS -->
  <link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/css/boots
trap.min.css"
integrity="sha384-BVYiiSIFeK1dGmJRAkycuHAHRg32OmUcww7on3RYdg4Va
+PmSTsz/K68vbdEjh4u" crossorigin="anonymous">
  <link rel="stylesheet" href="assets/css/main.css">
  <script
src="http://code.jquery.com/jquery-1.9.1.js"></script>
  <script
src="http://ajax.googleapis.com/ajax/libs/jquery/1.10.2/jquery.
min.js"></script>

  <script
src="http://netdna.bootstrapcdn.com/bootstrap/3.0.0/js/bootstra
p.min.js"></script>
  <script
src="http://code.jquery.com/ui/1.10.3/jquery-ui.js"></script>
</head>
<body>
  <div id="header">

    <!--Puts logo into Bootstrap grid so that it properly
resizes across devices-->
    <div class="container">
      <div class="row">
        <div class="col-sm-4" id="logo"><a
href="home.html"><div id="logo-img"></div></a></div>
        <div class="col-sm-4"></div>
        <div class="col-sm-4"></div>
      </div>
    </div>

    <!-- Static navbar -->
    <!-- HTML for the navigation bar - will collapse into a
dropdown button on small screens-->
    <div class="navbar navbar-inverse navbar-static-top">
      <div class="container">
```

```
        <div class="navbar-header">
          <button type="button" class="navbar-toggle"
data-toggle="collapse" data-target=".navbar-collapse">
            <span class="icon-bar"></span>
            <span class="icon-bar"></span>
            <span class="icon-bar"></span>
          </button>
        </div>
        <div class="navbar-collapse collapse">
          <ul class="nav navbar-nav navbar-left">
            <li><a href="home.html">Home</a></li>
            <li><a href="classrooms.php">Search by
Classrooms</a></li>
            <li><a href="features.php">Search by
Features</a></li>
            <li><a href="events.php">Confirmed
Reservations</a></li>
            <li><a href="schedule.php">Schedule a
class</a></li>
          </ul>
        </div><!--/.nav-collapse -->
      </div>
    </div>
  </div> <!--end Header-->
  <div id="body">
    <div class="container">
      <div class="row">
        <div class="col-md-9">
          <?php
            // Connecting, selecting database
            $dbconn = pg_connect("host=db.cs.wm.edu
dbname=swyao_CBS user=nswhay password=nswhay")
             or die('Could not connect:' . pg_last_error());
            $event_id = $_POST["event_id"];
            $verification = $_POST["verification"];

            // Set event_id to max of existing event ids +1
            $getReserverIdSql = "SELECT reserver_id FROM event
WHERE event_id=" .$event_id. ";";
            $getReserverIdresult = pg_query($getReserverIdSql)
or die('Query failed: ' . pg_last_error());
            $reserver_id = pg_fetch_array($getReserverIdresult,
null, PGSQL_NUM)[0];

            if (((int)$verification) == $reserver_id) {
              $sql = "BEGIN;";
              $sql .= "UPDATE times SET event_id=null WHERE
event_id=$event_id;";
```

```
            $sql .= "DELETE FROM event WHERE
event_id=$event_id;";
            $sql .= "COMMIT;";
            $result = pg_query($sql) or die('Query failed: '
. pg_last_error());
            echo "<h4 style='color: green;' >Booking No."
.$event_id. " has been successfully cancelled.</h4>";
         } else {
            echo "<h4 style='color: red;'>Verification
failed. You do not have the right to cancel this
booking.</h4>";
         }
      ?>
      <h5><a href="events.php">Go back to Comfirmed
Reservations</a></h5>
      </div>
    </div>

    </div>
  </div>
</body>
<?php
// Free resultset
pg_free_result($result);

// Closing connection
pg_close($dbconn);
?>
</html>
```

classroom.php:

```
<!DOCTYPE html>

<html lang="en">
<head>
  <title>CS421 Database G11 Project "Class Booking
Service"</title>
  <meta name="Author" content="Yangyang He">
  <meta content="width=device-width,initial-scale=1"
name=viewport>
  <!-- Latest compiled and minified CSS -->
  <link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/css/boots
trap.min.css"
integrity="sha384-BVYiiSIFeK1dGmJRAkycuHAHRg32OmUcww7on3RYdg4Va
+PmSTsz/K68vbdEjh4u" crossorigin="anonymous">
  <link rel="stylesheet" href="assets/css/main.css">
  <script
src="http://code.jquery.com/jquery-1.9.1.js"></script>
  <script
src="http://ajax.googleapis.com/ajax/libs/jquery/1.10.2/jquery.
min.js"></script>

  <script
src="http://netdna.bootstrapcdn.com/bootstrap/3.0.0/js/bootstra
p.min.js"></script>
  <script
src="http://code.jquery.com/ui/1.10.3/jquery-ui.js"></script>
</head>
<body>
  <div id="header">

    <!--Puts logo into Bootstrap grid so that it properly
resizes across devices-->
    <div class="container">
      <div class="row">
        <div class="col-sm-4" id="logo"><a
href="home.html"><div id="logo-img"></div></a></div>
        <div class="col-sm-4"></div>
        <div class="col-sm-4"></div>
      </div>
    </div>

    <!-- Static navbar -->
    <!-- HTML for the navigation bar - will collapse into a
dropdown button on small screens-->
    <div class="navbar navbar-inverse navbar-static-top">
      <div class="container">
```

```html
        <div class="navbar-header">
          <button type="button" class="navbar-toggle"
data-toggle="collapse" data-target=".navbar-collapse">
            <span class="icon-bar"></span>
            <span class="icon-bar"></span>
            <span class="icon-bar"></span>
          </button>
        </div>
        <div class="navbar-collapse collapse">
          <ul class="nav navbar-nav navbar-left">
            <li><a href="home.html">Home</a></li>
            <li><a href="classrooms.php">Search by
Classrooms</a></li>
            <li><a href="features.php">Search by
Features</a></li>
            <li><a href="events.php">Confirmed
Reservations</a></li>
            <li><a href="schedule.php">Schedule a
class</a></li>
          </ul>
        </div><!--/.nav-collapse -->
      </div>
    </div>
  </div> <!--end Header-->

  <div class="container">

    <div class="row">
      <div class="col-md-12">
        <input type="text" id="roomInput"
onkeyup="searchRoom()" placeholder="Type to search for
rooms..">

        <table id="roomTable">
        <tr>
          <th>Room ID</th>
          <th>Projector</th>
          <th>Board</th>
          <th>Visualizer</th>
          <th>Outlets No.</th>
          <th>Capacity</th>
        </tr>
        <?php
        // Performing SQL query
        $dbconn = pg_connect("host=db.cs.wm.edu
dbname=swyao_CBS user=nswhay password=nswhay")
        or die('Could not connect:' . pg_last_error());
        $query = "SELECT * FROM rooms";
```

```php
        $result = pg_query($query) or die('Query failed: ' .
pg_last_error());

        while ($line = pg_fetch_array($result, null,
PGSQL_NUM)) {
            echo "\t<tr>\n";
            echo "\t\t<td><a
href='booking.php?room=$line[0]'>$line[0]</a></td>\n";
            echo "\t\t<td>$line[3]</td>\n";
            echo "\t\t<td>$line[4]</td>\n";
            echo "\t\t<td>$line[5]</td>\n";
            echo "\t\t<td>$line[6]</td>\n";
            echo "\t\t<td>$line[7]</td>\n";
            echo "\t</tr>\n";
        }
        ?>
        </table>
        <script>
          function searchRoom() {
            // Declare variables
            var input, filter, table, tr, td, i;
            input = document.getElementById("roomInput");
            filter = input.value.toUpperCase();
            table = document.getElementById("roomTable");
            tr = table.getElementsByTagName("tr");

            // Loop through all table rows, and hide those who
don't match the search query
            for (i = 0; i < tr.length; i++) {
              td = tr[i].getElementsByTagName("td")[0];
              if (td) {
                if (td.innerHTML.toUpperCase().indexOf(filter)
> -1) {
                    tr[i].style.display = "";
                } else {
                  tr[i].style.display = "none";
                }
              }
            }
          }
        </script>
      </div>
    </div>
  </div>
</body>
<?php
// Free resultset
pg_free_result($result);
```

```
// Closing connection
pg_close($dbconn);
?>
</html>
```

confirmation.php:
```html
<!DOCTYPE html>

<html lang="en">
<head>
  <title>CS421 Database G11 Project "Class Booking
Service"</title>
  <meta name="Author" content="Yangyang He">
  <meta content="width=device-width,initial-scale=1"
name=viewport>
  <!-- Latest compiled and minified CSS -->
  <link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/css/boots
trap.min.css"
integrity="sha384-BVYiiSIFeK1dGmJRAkycuHAHRg32OmUcww7on3RYdg4Va
+PmSTsz/K68vbdEjh4u" crossorigin="anonymous">
  <link rel="stylesheet" href="assets/css/main.css">
  <script
src="http://code.jquery.com/jquery-1.9.1.js"></script>
  <script
src="http://ajax.googleapis.com/ajax/libs/jquery/1.10.2/jquery.
min.js"></script>

  <script
src="http://netdna.bootstrapcdn.com/bootstrap/3.0.0/js/bootstra
p.min.js"></script>
  <script
src="http://code.jquery.com/ui/1.10.3/jquery-ui.js"></script>
</head>
<body>
  <div id="header">

    <!--Puts logo into Bootstrap grid so that it properly
resizes across devices-->
    <div class="container">
      <div class="row">
        <div class="col-sm-4" id="logo"><a
href="home.html"><div id="logo-img"></div></a></div>
        <div class="col-sm-4"></div>
        <div class="col-sm-4"></div>
      </div>
    </div>

    <!-- Static navbar -->
    <!-- HTML for the navigation bar - will collapse into a
dropdown button on small screens-->
    <div class="navbar navbar-inverse navbar-static-top">
      <div class="container">
```

```html
        <div class="navbar-header">
          <button type="button" class="navbar-toggle"
data-toggle="collapse" data-target=".navbar-collapse">
            <span class="icon-bar"></span>
            <span class="icon-bar"></span>
            <span class="icon-bar"></span>
          </button>
        </div>
        <div class="navbar-collapse collapse">
          <ul class="nav navbar-nav navbar-left">
            <li><a href="home.html">Home</a></li>
            <li><a href="classrooms.php">Search by
Classrooms</a></li>
            <li><a href="features.php">Search by
Features</a></li>
            <li><a href="events.php">Confirmed
Reservations</a></li>
            <li><a href="schedule.php">Schedule a
class</a></li>
          </ul>
        </div><!--/.nav-collapse -->
      </div>
    </div>
  </div> <!--end Header-->
  <div id="body">
    <div class="container">
      <div class="row">
        <div class="col-md-12">
          <?php
            // Connecting, selecting database
            $dbconn = pg_connect("host=db.cs.wm.edu
dbname=swyao_CBS user=nswhay password=nswhay")
             or die('Could not connect:' . pg_last_error());
            $timeList = $_POST["time_list"];
            $info = $_POST["info"];
            $room = $_POST["room"];
            $reserver = $_POST["reserver_id"];

            // Set event_id to max of existing event ids +1
            $getEventIdSql = "SELECT MAX(event_id)+1 FROM
event;";
            $getEventIdresult = pg_query($getEventIdSql) or
die('Query failed: ' . pg_last_error());
            $event_id = pg_fetch_array($getEventIdresult, null,
PGSQL_NUM)[0];

            // SQL insert new reserver and new event
            $sql = "BEGIN;";
```

```php
            // Only insert reserver if not exist
            $checkUserSql = "SELECT count(*) FROM reserver
WHERE reserver_id=" .$reserver. ";";
            $checkUserResult = pg_query($checkUserSql) or
die('Query failed: ' . pg_last_error());
            if (pg_fetch_array($checkUserResult, null,
PGSQL_NUM)[0] == 0) {
                $sql .= "INSERT INTO reserver VALUES(" .
$reserver . ",3);";
            }

            $sql .= "INSERT INTO event VALUES(" . $event_id .
"," . $reserver . ",'student','" . $info ."');" ;
            $sql .= "COMMIT;";
            $result = pg_query($sql) or die('Query failed: ' .
pg_last_error());
            foreach ($timeList as $selectedTime) {
              switch (((int)$selectedTime) % 26) {
                case 0:
                  $time = '08:00';
                  break;
                case 1:
                  $time = '08:30';
                  break;
                case 2:
                  $time = '09:00';
                  break;
                case 3:
                  $time = '09:30';
                  break;
                case 4:
                  $time = '10:00';
                  break;
                case 5:
                  $time = '10:30';
                  break;
                case 6:
                  $time = '11:00';
                  break;
                case 7:
                  $time = '11:30';
                  break;
                case 8:
                  $time = '12:00';
                  break;
                case 9:
                  $time = '12:30';
                  break;
```

```php
        case 10:
          $time = '13:00';
          break;
        case 11:
          $time = '13:30';
          break;
        case 12:
          $time = '14:00';
          break;
        case 13:
          $time = '14:30';
          break;
        case 14:
          $time = '15:00';
          break;
        case 15:
          $time = '15:30';
          break;
        case 16:
          $time = '16:00';
          break;
        case 17:
          $time = '16:30';
          break;
        case 18:
          $time = '17:00';
          break;
        case 19:
          $time = '17:30';
          break;
        case 20:
          $time = '18:00';
          break;
        case 21:
          $time = '18:30';
          break;
        case 22:
          $time = '19:00';
          break;
        case 23:
          $time = '19:30';
          break;
        case 24:
          $time = '20:00';
          break;
        case 25:
          $time = '20:30';
          break;
```

```php
              }
              $d = 1;
              switch ((int)((int)$selectedTime / 26)) {
                case 0:
                  $date = '2017-04-17';
                  break;
                case 1:
                  $date = '2017-04-18';
                  break;
                case 2:
                  $date = '2017-04-19';
                  break;
                case 3:
                  $date = '2017-04-20';
                  break;
                case 4:
                  $date = '2017-04-21';
                  break;
              }
              $sql = "BEGIN;";
              $sql .= "UPDATE times SET event_id=" . $event_id
. " ";
              $sql .= "WHERE room_id='" .$room. "' AND time='"
.$time. "' AND date ='" .$date."';";
              $sql .= "COMMIT;";
              $result = pg_query($sql) or die('Query failed: '
. pg_last_error());
              echo "<h4 style='color: green;'>";
              echo "Student " . $reserver;
              echo " has successfully booked " . $room;
              echo " for " . $info . " (Event No."
.$event_id.")";
              echo " on " . $date . " " . $time;
              echo "<h4>";
            }
         ?>
         <h5><a href="home.html">Go back to home page</a></h5>
       </div>
     </div>

   </div>
  </div>
</body>
<?php
// Free resultset
pg_free_result($result);

// Closing connection
```

```
pg_close($dbconn);
?>
</html>
```

events.php:
```
<!DOCTYPE html>

<html lang="en">
<head>
  <title>CS421 Database G11 Project "Class Booking
Service"</title>
  <meta name="Author" content="Yangyang He">
  <meta content="width=device-width,initial-scale=1"
name=viewport>
  <!-- Latest compiled and minified CSS -->
  <link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/css/boots
trap.min.css"
integrity="sha384-BVYiiSIFeK1dGmJRAkycuHAHRg32OmUcww7on3RYdg4Va
+PmSTsz/K68vbdEjh4u" crossorigin="anonymous">
  <link rel="stylesheet" href="assets/css/main.css">
  <script
src="http://code.jquery.com/jquery-1.9.1.js"></script>
  <script
src="http://ajax.googleapis.com/ajax/libs/jquery/1.10.2/jquery.
min.js"></script>

  <script
src="http://netdna.bootstrapcdn.com/bootstrap/3.0.0/js/bootstra
p.min.js"></script>
  <script
src="http://code.jquery.com/ui/1.10.3/jquery-ui.js"></script>
</head>
<body>
  <div id="header">

    <!--Puts logo into Bootstrap grid so that it properly
resizes across devices-->
    <div class="container">
      <div class="row">
        <div class="col-sm-4" id="logo"><a
href="home.html"><div id="logo-img"></div></a></div>
        <div class="col-sm-4"></div>
        <div class="col-sm-4"></div>
      </div>
    </div>

    <!-- Static navbar -->
    <!-- HTML for the navigation bar - will collapse into a
dropdown button on small screens-->
    <div class="navbar navbar-inverse navbar-static-top">
      <div class="container">
```

```html
        <div class="navbar-header">
          <button type="button" class="navbar-toggle"
data-toggle="collapse" data-target=".navbar-collapse">
            <span class="icon-bar"></span>
            <span class="icon-bar"></span>
            <span class="icon-bar"></span>
          </button>
        </div>
        <div class="navbar-collapse collapse">
          <ul class="nav navbar-nav navbar-left">
            <li><a href="home.html">Home</a></li>
            <li><a href="classrooms.php">Search by
Classrooms</a></li>
            <li><a href="features.php">Search by
Features</a></li>
            <li><a href="events.php">Confirmed
Reservations</a></li>
            <li><a href="schedule.php">Schedule a
class</a></li>
          </ul>
        </div><!--/.nav-collapse -->
      </div>
    </div>
  </div> <!--end Header-->
  <div id="body">
    <div class="container">
      <div class="row">
        <div class="col-md-12">
          <h5>* Only student reservations is displayed
here</h5>
          <input type="text" id="roomInput"
onkeyup="searchRoom()" placeholder="Type to search for
event..">
          <table id="roomTable">
          <tr>
            <th>Event Title</th>
            <th>Seq. No.</th>
            <th>Classification</th>
            <th>Action</th>
          </tr>
          <?php
          // Performing SQL query
          $dbconn = pg_connect("host=db.cs.wm.edu
dbname=swyao_CBS user=nswhay password=nswhay")
          or die('Could not connect:' . pg_last_error());
          $query = "SELECT * FROM event WHERE type='student'";
          $result = pg_query($query) or die('Query failed: ' .
pg_last_error());
```

```php
            while ($line = pg_fetch_array($result, null,
PGSQL_NUM)) {
                echo "\t<tr>\n";
                echo "\t\t<td>$line[3]</td>\n";
                echo "\t\t<td>$line[0]</td>\n";
                echo "\t\t<td>$line[2]</td>\n";
                echo "\t\t<td><a
href='verification.php?event_id=$line[0]'>Cancel</a></td>\n";
                echo "\t</tr>\n";
            }
            ?>
            </table>
            <script>
              function searchRoom() {
                // Declare variables
                var input, filter, table, tr, td, i;
                input = document.getElementById("roomInput");
                filter = input.value.toUpperCase();
                table = document.getElementById("roomTable");
                tr = table.getElementsByTagName("tr");

                // Loop through all table rows, and hide those
who don't match the search query
                for (i = 0; i < tr.length; i++) {
                  td = tr[i].getElementsByTagName("td")[0];
                  if (td) {
                    if
(td.innerHTML.toUpperCase().indexOf(filter) > -1) {
                      tr[i].style.display = "";
                    } else {
                      tr[i].style.display = "none";
                    }
                  }
                }
              }
            </script>
          </div>
        </div>

    </div>
  </div>
</body>
<?php
// Free resultset
pg_free_result($result);

// Closing connection
```

```
pg_close($dbconn);
?>
</html>
```

features.php:
```
<!DOCTYPE html>

<html lang="en">
<head>
  <title>CS421 Database G11 Project "Class Booking
Service"</title>
  <meta name="Author" content="Yangyang He">
  <meta content="width=device-width,initial-scale=1"
name=viewport>
  <!-- Latest compiled and minified CSS -->
  <link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/css/boots
trap.min.css"
integrity="sha384-BVYiiSIFeK1dGmJRAkycuHAHRg32OmUcww7on3RYdg4Va
+PmSTsz/K68vbdEjh4u" crossorigin="anonymous">
  <link rel="stylesheet" href="assets/css/main.css">
  <script
src="http://code.jquery.com/jquery-1.9.1.js"></script>
  <script
src="http://ajax.googleapis.com/ajax/libs/jquery/1.10.2/jquery.
min.js"></script>

  <script
src="http://netdna.bootstrapcdn.com/bootstrap/3.0.0/js/bootstra
p.min.js"></script>
  <script
src="http://code.jquery.com/ui/1.10.3/jquery-ui.js"></script>
</head>
<body>
  <div id="header">

    <!--Puts logo into Bootstrap grid so that it properly
resizes across devices-->
    <div class="container">
      <div class="row">
        <div class="col-sm-4" id="logo"><a
href="home.html"><div id="logo-img"></div></a></div>
        <div class="col-sm-4"></div>
        <div class="col-sm-4"></div>
      </div>
    </div>

    <!-- Static navbar -->
```

```html
    <!-- HTML for the navigation bar - will collapse into a
dropdown button on small screens-->
    <div class="navbar navbar-inverse navbar-static-top">
      <div class="container">
        <div class="navbar-header">
          <button type="button" class="navbar-toggle"
data-toggle="collapse" data-target=".navbar-collapse">
            <span class="icon-bar"></span>
            <span class="icon-bar"></span>
            <span class="icon-bar"></span>
          </button>
        </div>
        <div class="navbar-collapse collapse">
          <ul class="nav navbar-nav navbar-left">
            <li><a href="home.html">Home</a></li>
            <li><a href="classrooms.php">Search by
Classrooms</a></li>
            <li><a href="features.php">Search by
Features</a></li>
            <li><a href="events.php">Confirmed
Reservations</a></li>
            <li><a href="schedule.php">Schedule a
class</a></li>
          </ul>
        </div><!--/.nav-collapse -->
      </div>
    </div>
  </div> <!--end Header-->
  <div id="body">
    <div class="container">
      <div class="row">
        <div class="col-md-9">
          <p><strong>Please check the features you would like
to have:</strong></p>
          <form action ="features.php" method="post">
            <div class="row">
              <div class="col-md-2">
                <input type="checkbox" name="projector"
value="true">
                <span>Projector</span>
              </div>
              <div class="col-md-2">
                <input type="checkbox" name="chalkboard"
value="true">
                <span>Chalkboard</span>
              </div>
              <div class="col-md-2">
                <input type="checkbox" name="whiteboard"
```

```
value="true">
                  <span>Whiteboard</span>
                </div>
                <div class="col-md-2">
                  <input type="checkbox" name="visualizer"
value="true">
                  <span>Visualizer</span>
                </div>
              </div>
              <div class="row">
                <div class="col-md-8">
                  <span>Minimum number of outlets: </span>
                  <input type="number" name="min_outlets"
min="0">
                </div>
              </div>
              <div class="row">
                <div class="col-md-8">
                  <span>Minimum capacity: </span>
                  <input type="number" name="min_cap" min="0">
                </div>
              </div>
              <div class="row">
                <div class="col-md-2">
                  <input type="submit" value="Search Rooms">
                </div>
                <div class="col-md-2">
                  <input type ="reset">
                </div>
              </div>
            </form>
          </div>
        </div>

        <div class="row">
          <div class="col-md-12">
            <table id="roomTable">
              <tr>
                <th>Room ID</th>
                <th>Projector</th>
                <th>Board</th>
                <th>Visualizer</th>
                <th>Outlets No.</th>
                <th>Capacity</th>
              </tr>
              <?php
                // Connecting, selecting database
                $dbconn = pg_connect("host=db.cs.wm.edu
```

```php
dbname=swyao_CBS user=nswhay password=nswhay")
            or die('Could not connect:' . pg_last_error());
        $sql = "SELECT * FROM rooms WHERE ";

        //filter projectors
        if ($_POST["projector"] == "true") {
          $sql .= "projector = 'YES'";
        } else {
          // prepare sql with "AND" for further filters
          $sql .= "(projector = 'YES' OR projector =
'NO')";
        }
        //filter boards
        if ($_POST["chalkboard"] == "true") {
          if ($_POST["whiteboard"] == "true") {
            $sql .= " AND whiteboard = 'BOTH'";
          } else {
            $sql .= " AND whiteboard = 'CHALKBOARD'";
          }
        } else {
          if ($_POST["whiteboard"] == "true") {
            $sql .= " AND whiteboard = 'WHITEBOARD'";
          }
        }
        //filter visualizers
        if ($_POST["visualizer"] == "true") {
          $sql .= " AND visualizer = 'YES'";
        }
        //filter outlets
        $min_outlets = (is_numeric($_POST["min_outlets"])
? (int)$_POST["min_outlets"] : 0);
        $sql .= " AND outlets >= ".$min_outlets;
        //filter capacity
        $min_cap = (is_numeric($_POST["min_cap"]) ?
(int)$_POST["min_cap"] : 0);
        $sql .= " AND capacity >= ".$min_cap;
        $sql .= ";";

        $result = pg_query($sql) or die('Query failed: '
. pg_last_error());

        while ($line = pg_fetch_array($result, null,
PGSQL_NUM)) {
            echo "\t<tr>\n";
            echo "\t\t<td><a
href='booking.php?room=$line[0]'>$line[0]</a></td>\n";
            echo "\t\t<td>$line[3]</td>\n";
            echo "\t\t<td>$line[4]</td>\n";
```

```php
                    echo "\t\t<td>$line[5]</td>\n";
                    echo "\t\t<td>$line[6]</td>\n";
                    echo "\t\t<td>$line[7]</td>\n";
                    echo "\t</tr>\n";
                }
            ?>
            </table>
        </div>
      </div>
    </div>
</body>
<?php
// Free resultset
pg_free_result($result);

// Closing connection
pg_close($dbconn);
?>
</html>
```

home.html:

```
<!doctype html>
<html lang="en">
<head>
  <title>CS421 Database G11 Project "Class Booking
Service"</title>
  <meta name="Author" content="Yangyang He">
  <meta content="width=device-width,initial-scale=1"
name=viewport>
  <!-- Latest compiled and minified CSS -->
  <link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/css/boots
trap.min.css"
integrity="sha384-BVYiiSIFeK1dGmJRAkycuHAHRg32OmUcww7on3RYdg4Va
+PmSTsz/K68vbdEjh4u" crossorigin="anonymous">
  <link rel="stylesheet" href="assets/css/main.css">
  <script
src="http://code.jquery.com/jquery-1.9.1.js"></script>
  <script
src="http://ajax.googleapis.com/ajax/libs/jquery/1.10.2/jquery.
min.js"></script>

  <script
src="http://netdna.bootstrapcdn.com/bootstrap/3.0.0/js/bootstra
p.min.js"></script>
  <script
src="http://code.jquery.com/ui/1.10.3/jquery-ui.js"></script>
</head>
<body>

  <div id="header">
    <!--Puts logo into Bootstrap grid so that it properly
resizes across devices-->
    <div class="container">
      <div class="row">
        <div class="col-sm-4" id="logo"><a
href="home.html"><div id="logo-img"></div></a></div>
        <div class="col-sm-4"></div>
        <div class="col-sm-4"></div>
      </div>
    </div>

    <!-- Static navbar -->
    <!-- HTML for the navigation bar - will collapse into a
dropdown button on small screens-->
    <div class="navbar navbar-inverse navbar-static-top">
      <div class="container">
        <div class="navbar-header">
```

```html
            <button type="button" class="navbar-toggle"
data-toggle="collapse" data-target=".navbar-collapse">
            <span class="icon-bar"></span>
            <span class="icon-bar"></span>
            <span class="icon-bar"></span>
          </button>
        </div>
        <div class="navbar-collapse collapse">
          <ul class="nav navbar-nav navbar-left">
            <li><a href="home.html">Home</a></li>
            <li><a href="classrooms.php">Search by
Classrooms</a></li>
            <li><a href="features.php">Search by
Features</a></li>
            <li><a href="events.php">Confirmed
Reservations</a></li>
            <li><a href="schedule.php">Schedule a
class</a></li>
          </ul>
        </div><!--/.nav-collapse -->
      </div>
    </div>
  </div> <!--end Header-->

  <div class="container">
    <div class="row">
      <div class="col-md-9">
        <h3>Group Members</h3>
        <ul>
          <li>Shennie Yao</li>
          <li>Nicholas Whays (Contact Person)</li>
          <li>Yangyang He</li>
        </ul>
      </div>
    </div>
    <div class="row">
      <div class="col-md-9">
        <h3>Stage Documents</h3>
        <ul>
          <li><a href="assets/CBS_STAGE_1.pdf">Stage 1
(PDF)</a></li>
          <li><a href="assets/CBS_STAGE_2.pdf">Stage 2
(PDF)</a></li>
          <li><a href="assets/CBS_STAGE_3.pdf">Stage 3
(PDF)</a></li>
        </ul>
      </div>
    </div>
```

```
        </div>
    </body>
</html>
```

run-schedule.php:

```
<!DOCTYPE html>
<html>
      <head>
            <meta content="text/html;charset=utf-8"
http-equiv="Content-Type">
            <meta content="utf-8" http-equiv="encoding">
            <title>CS421 Database G11 Project "Class Booking
Service"</title>
        <meta name="Author" content="Yangyang He">
        <meta content="width=device-width,initial-scale=1"
name=viewport>
        <!-- Latest compiled and minified CSS -->
        <link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/css/boots
trap.min.css"
integrity="sha384-BVYiiSIFeK1dGmJRAkycuHAHRg32OmUcww7on3RYdg4Va
+PmSTsz/K68vbdEjh4u" crossorigin="anonymous">
        <link rel="stylesheet" href="assets/css/main.css">
        <script
src="http://code.jquery.com/jquery-1.9.1.js"></script>
        <script
src="http://ajax.googleapis.com/ajax/libs/jquery/1.10.2/jquery.
min.js"></script>


        <script
src="http://netdna.bootstrapcdn.com/bootstrap/3.0.0/js/bootstra
p.min.js"></script>
        <script
src="http://code.jquery.com/ui/1.10.3/jquery-ui.js"></script>
      </head>
      <body>
            <div id="header">
          <!--Puts logo into Bootstrap grid so that it properly
resizes across devices-->
          <div class="container">
            <div class="row">
              <div class="col-sm-4" id="logo"><a
href="home.html"><div id="logo-img"></div></a></div>
              <div class="col-sm-4"></div>
              <div class="col-sm-4"></div>
            </div>
          </div>

          <!-- Static navbar -->
          <!-- HTML for the navigation bar - will collapse into
a dropdown button on small screens-->
          <div class="navbar navbar-inverse navbar-static-top">
```

```html
            <div class="container">
              <div class="navbar-header">
                <button type="button" class="navbar-toggle"
data-toggle="collapse" data-target=".navbar-collapse">
                  <span class="icon-bar"></span>
                  <span class="icon-bar"></span>
                  <span class="icon-bar"></span>
                </button>
              </div>
              <div class="navbar-collapse collapse">
                <ul class="nav navbar-nav navbar-left">
                  <li><a href="home.html">Home</a></li>
                  <li><a href="classrooms.php">Search by
Classrooms</a></li>
                  <li><a href="features.php">Search by
Features</a></li>
                  <li><a href="events.php">Confirmed
Reservations</a></li>
                  <li><a href="schedule.php">Schedule a
class</a></li>
                </ul>
              </div><!--/.nav-collapse -->
            </div>
          </div>
        </div> <!--end Header-->

          <div class="container">
              <div class="row">
                  <div class="col-md-12" id="middle">
          <?php
            shell_exec('python alg.py');
            echo "<h4 style='color: green;'>Successfully
scheduled classes!</h4>";
          ?>
                  </div>
              </div>
          </div>
      </body>
</html>
```

schedule.php:
```
<!DOCTYPE html>
<html>
      <head>
            <meta content="text/html;charset=utf-8"
http-equiv="Content-Type">
            <meta content="utf-8" http-equiv="encoding">
            <title>CS421 Database G11 Project "Class Booking
Service"</title>
        <meta name="Author" content="Yangyang He">
        <meta content="width=device-width,initial-scale=1"
name=viewport>
        <!-- Latest compiled and minified CSS -->
        <link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/css/boots
trap.min.css"
integrity="sha384-BVYiiSIFeK1dGmJRAkycuHAHRg32OmUcww7on3RYdg4Va
+PmSTsz/K68vbdEjh4u" crossorigin="anonymous">
        <link rel="stylesheet" href="assets/css/main.css">
        <script
src="http://code.jquery.com/jquery-1.9.1.js"></script>
        <script
src="http://ajax.googleapis.com/ajax/libs/jquery/1.10.2/jquery.
min.js"></script>


        <script
src="http://netdna.bootstrapcdn.com/bootstrap/3.0.0/js/bootstra
p.min.js"></script>
        <script
src="http://code.jquery.com/ui/1.10.3/jquery-ui.js"></script>
      </head>
      <body>
            <div id="header">
          <!--Puts logo into Bootstrap grid so that it properly
resizes across devices-->
          <div class="container">
            <div class="row">
              <div class="col-sm-4" id="logo"><a
href="home.html"><div id="logo-img"></div></a></div>
                <div class="col-sm-4"></div>
                <div class="col-sm-4"></div>
            </div>
          </div>

          <!-- Static navbar -->
          <!-- HTML for the navigation bar - will collapse into
a dropdown button on small screens-->
          <div class="navbar navbar-inverse navbar-static-top">
```

```
            <div class="container">
              <div class="navbar-header">
                <button type="button" class="navbar-toggle"
data-toggle="collapse" data-target=".navbar-collapse">
                  <span class="icon-bar"></span>
                  <span class="icon-bar"></span>
                  <span class="icon-bar"></span>
                </button>
              </div>
              <div class="navbar-collapse collapse">
                <ul class="nav navbar-nav navbar-left">
                  <li><a href="home.html">Home</a></li>
                  <li><a href="classrooms.php">Search by
Classrooms</a></li>
                  <li><a href="features.php">Search by
Features</a></li>
                  <li><a href="events.php">Confirmed
Reservations</a></li>
                  <li><a href="schedule.php">Schedule a
class</a></li>
                </ul>
              </div><!--/.nav-collapse -->
            </div>
          </div>
        </div> <!--end Header-->

          <div class="container">
              <div class="row">
                    <div class="col-md-12" id="middle">
                        <h3>Schedule a Class</h3>
                    </div>
                    <form action="write-input.php"
method="post">
                          <div class="row">
                              <div class="col-md-6"
id="right-label">
                                    <h5>CRN: </h5>
                              </div>
                              <div class="col-md-6">
                                    <input type="text"
name="crn" required>
                              </div>
                          </div>
                          <div class="row">
                              <div class="col-md-6"
id="right-label">
                                    <h5>Desired room: </h5>
                              </div>
```

```
                                <div class="col-md-6">
                                <select name="building"
id='building'>
                                        <option value="null">No
Preference</option>
                                        <?php
                                                $dbcon =
pg_connect("host=db.cs.wm.edu dbname=swyao_CBS user=nswhay
password=nswhay");
                                                $query =
pg_query($dbcon, "select * from rooms;");


while($row=pg_fetch_assoc($query)){
                                                echo '<option
value="'.htmlspecialchars($row['room_id']).'">'.htmlspecialchar
s($row['room_id']).'</option>';
                                                }
                                                pg_close($dbcon);
                                        ?>
                                        </select>
                                </div>
                        </div>
                        <div class="row">
                                <div class="col-md-6"
id="right-label">
                                        <h5>Start Time: </h5>
                                </div>
                                <div class="col-md-6">
                                        <select name="start"
id='start'>
                                                <?php
                                                $c = 8;
                                                while ($c < 21)
{
                                                        echo
'<option value=' .$c. '>' .$c. '</option>';
                                                        $c = $c +
.5;
                                                        }
                                                ?>
                        </select>
                                </div>
                        </div>
                        <div class="row">
                                <div class="col-md-6"
id="right-label">
                                        <h5>Duration: </h5>
```

```
                                        </div>
                                        <div class="col-md-6">
                                            <select name="duration">
                                                <option
value='1'>1hr</option>
                                                <option
value='1.5'>1.5hrs</option>
                                            </select>
                                        </div>
                                    </div>
                                    <div class="row">
                                        <div class="col-md-6"
id="right-label">
                                            <h5>Days: </h5>
                                        </div>
                                        <div class="col-md-6">
                                            <select name="days">
                                                <option
value='MWF'>MWF</option>
                                                <option
value='TR'>TR</option>
                                            </select>
                                        </div>
                                    </div>
                                    <div class="row">
                                        <div class="col-md-6"
id="right-label">
                                            <h5>Capacity: </h5>
                                        </div>
                                        <div class="col-md-6">
                                            <input type='number'
name='capacity' min='0' value='0'>
                                        </div>
                                    </div>
                                    <div class="row">
                                        <div class="col-md-6"
id="right-label">
                                            <h5>Projector: </h5>
                                        </div>
                                        <div class="col-md-6">
                                            <select name="projector">
                                                <option
value='null'>No Preference</option>
                                                <option
value='0'>No</option>
                                                <option
value='1'>Yes</option>
                                            </select>
```

```
                        </div>
                    </div>
                    <div class="row">
                        <div class="col-md-6"
id="right-label">
                            <h5>Visualizer: </h5>
                        </div>
                        <div class="col-md-6">
                            <select name="visualizer">
                                <option
value='null'>No Preference</option>
                                <option
value='0'>No</option>
                                <option
value='1'>Yes</option>
                            </select>
                        </div>
                    </div>
                    <div class="row">
                        <div class="col-md-6"
id="right-label">
                            <h5> Board type: </h5>
                        </div>
                        <div class="col-md-6">
                            <select name="board">
                                <option
value='null'>No Preference</option>
                                <option
value='0'>Chalkboard</option>
                                <option
value='1'>Whiteboard</option>
                            </select>
                        </div>
                    </div>
                    <div class="row">
                        <div class="col-md-6"
id="right-label">
                            <h5>Desired outlets: </h5>
                        </div>
                        <div class="col-md-6">
                            <input type='number'
name='outlets' min='0' value='0'>
                        </div>
                    </div>
                    <div class="row">
                        <div class="col-md-12"
id="middle">
                            <input type="submit"
```

```
name="submit" value="Submit this class schedule">
                                    <input type='reset'
name='reset' value='Reset all field'>
                                </div>
                            </div>
                        </form>
                    </div>
                    <div class="row">
                        <div class="col-md-12" id="middle">
                            <h6><a
href="admin-login.html">Administrator login</a></h6>
                        </div>
                    </div>
                </div>
        </body>
</html>
```

verification.php:

```html
<!DOCTYPE html>

<html lang="en">
<head>
  <title>CS421 Database G11 Project "Class Booking
Service"</title>
  <meta name="Author" content="Yangyang He">
  <meta content="width=device-width,initial-scale=1"
name=viewport>
  <!-- Latest compiled and minified CSS -->
  <link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/css/boots
trap.min.css"
integrity="sha384-BVYiiSIFeK1dGmJRAkycuHAHRg32OmUcww7on3RYdg4Va
+PmSTsz/K68vbdEjh4u" crossorigin="anonymous">
  <link rel="stylesheet" href="assets/css/main.css">
  <script
src="http://code.jquery.com/jquery-1.9.1.js"></script>
  <script
src="http://ajax.googleapis.com/ajax/libs/jquery/1.10.2/jquery.
min.js"></script>

  <script
src="http://netdna.bootstrapcdn.com/bootstrap/3.0.0/js/bootstra
p.min.js"></script>
  <script
src="http://code.jquery.com/ui/1.10.3/jquery-ui.js"></script>
</head>
<body>
  <div id="header">

    <!--Puts logo into Bootstrap grid so that it properly
resizes across devices-->
    <div class="container">
      <div class="row">
        <div class="col-sm-4" id="logo"><a
href="home.html"><div id="logo-img"></div></a></div>
        <div class="col-sm-4"></div>
        <div class="col-sm-4"></div>
      </div>
    </div>

    <!-- Static navbar -->
    <!-- HTML for the navigation bar - will collapse into a
dropdown button on small screens-->
    <div class="navbar navbar-inverse navbar-static-top">
      <div class="container">
```

```html
        <div class="navbar-header">
          <button type="button" class="navbar-toggle"
data-toggle="collapse" data-target=".navbar-collapse">
            <span class="icon-bar"></span>
            <span class="icon-bar"></span>
            <span class="icon-bar"></span>
          </button>
        </div>
        <div class="navbar-collapse collapse">
          <ul class="nav navbar-nav navbar-left">
            <li><a href="home.html">Home</a></li>
            <li><a href="classrooms.php">Search by
Classrooms</a></li>
            <li><a href="features.php">Search by
Features</a></li>
            <li><a href="events.php">Confirmed
Reservations</a></li>
            <li><a href="schedule.php">Schedule a
class</a></li>
          </ul>
        </div><!--/.nav-collapse -->
      </div>
    </div>
  </div> <!--end Header-->
  <div id="body">
    <div class="container">
      <form action="cancel-confirmation.php" method="post">
        <div class="row">
          <div class="col-md-12">
            <h4><span style="color: red;">*</span>Please
provide the reserver's student ID to cancel this booking:</h4>
            <input type="number" id="verificationInput"
name="verification" min="0">
          </div>
        </div>
        <div class="row">
          <div class="col-md-12">
            <input type="hidden" name="event_id" value="<?php
echo htmlspecialchars($_GET['event_id']) ?>">
            <input type="submit" name="submit" value="Confirm
Cancellation">
          </div>
        </div>
      </form>
    </div>
  </div>
</body>
<?php
```

```php
// Free resultset
pg_free_result($result);

// Closing connection
pg_close($dbconn);
?>
</html>
```

write-input.php:

```html
<!doctype html>
<html>
<head>
      <meta content="text/html;charset=utf-8"
http-equiv="Content-Type">
      <meta content="utf-8" http-equiv="encoding">
      <title>CS421 Database G11 Project "Class Booking
Service"</title>
      <meta name="Author" content="Yangyang He">
      <meta content="width=device-width,initial-scale=1"
name=viewport>
      <!-- Latest compiled and minified CSS -->
      <link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/css/boots
trap.min.css"
integrity="sha384-BVYiiSIFeK1dGmJRAkycuHAHRg32OmUcww7on3RYdg4Va
+PmSTsz/K68vbdEjh4u" crossorigin="anonymous">
      <link rel="stylesheet" href="assets/css/main.css">
      <script
src="http://code.jquery.com/jquery-1.9.1.js"></script>
      <script
src="http://ajax.googleapis.com/ajax/libs/jquery/1.10.2/jquery.
min.js"></script>


      <script
src="http://netdna.bootstrapcdn.com/bootstrap/3.0.0/js/bootstra
p.min.js"></script>
      <script
src="http://code.jquery.com/ui/1.10.3/jquery-ui.js"></script>
</head>

<body>
      <div id="header">
            <!--Puts logo into Bootstrap grid so that it properly
resizes across devices-->
            <div class="container">
                  <div class="row">
                        <div class="col-sm-4" id="logo"><a
href="home.html"><div id="logo-img"></div></a></div>
                        <div class="col-sm-4"></div>
                        <div class="col-sm-4"></div>
                  </div>
            </div>

            <!-- Static navbar -->
            <!-- HTML for the navigation bar - will collapse into
a dropdown button on small screens-->
```

```
            <div class="navbar navbar-inverse navbar-static-top">
                <div class="container">
                    <div class="navbar-header">
                        <button type="button"
class="navbar-toggle" data-toggle="collapse"
data-target=".navbar-collapse">
                            <span class="icon-bar"></span>
                            <span class="icon-bar"></span>
                            <span class="icon-bar"></span>
                        </button>
                    </div>
                    <div class="navbar-collapse collapse">
                        <ul class="nav navbar-nav
navbar-left">
                            <li><a
href="home.html">Home</a></li>
                            <li><a
href="classrooms.php">Search by Classrooms</a></li>
                            <li><a
href="features.php">Search by Features</a></li>
                            <li><a
href="events.php">Confirmed Reservations</a></li>
                            <li><a
href="schedule.php">Schedule a class</a></li>
                        </ul>
                    </div><!--/.nav-collapse -->
                </div>
            </div>
        </div> <!--end Header-->

        <div class="container">
            <div class="row">
                <div class="col-md-12">
                    <h4 style='color: green;'>Your request for
course <?php echo $_POST["crn"]; ?> has been submitted.</h4>
                    <h5><a href="schedule.php">Return to
previous page</a></h5>
                </div>
            </div>
        </div>
        <?php
            if ($_POST['building'] == "null"){
                $build = "null";
                $room = "null";
            }
            else{
                $b = explode(' ', $_POST['building']);
                $build = $b[0];
```

```php
                    $room = $b[1];
            }
            $txt =
$_POST["crn"].','.$build.','.$room.','.$_POST["start"].','.$_PO
ST["duration"].','.$_POST["days"].','.$_POST["capacity"].','.$_
POST["projector"].','.$_POST["visualizer"].','.$_POST["board"].
','.$_POST["outlets"];
            $f = fopen("input.txt","a") or die("unable");
            fwrite($f, $txt . "\n");
            fclose($f);
    ?>

<body>
<html>
```

alg.py

```python
import psycopg2
import getpass
import sys

mondays=['1-23','1-30','2-6','2-13','2-20','2-27','3-6','3-
13','3-20','3-27','4-3','4-10','4-17','4-24']
tuesdays=['1-24', '1-31', '2-7', '2-14', '2-21', '2-28',
'3-7', '3-14', '3-21', '3-28', '4-4', '4-11', '4-18',
'4-25']
wednesdays=['1-18','1-25','2-1','2-8','2-15','2-22','3-1','
3-8','3-15','3-22','3-29','4-5','4-12','4-19','4-26']
thursdays=['1-19','1-26','2-2','2-9','2-16','2-23','3-2','3
-9','3-16','3-23','3-30','4-6','4-13','4-20','4-27',]
fridays=['1-20','1-27','2-3','2-10','2-17','2-24','3-3','3-
10','3-17','3-24','3-31','4-7','4-14','4-21','4-28']


def request_from_db(request_str):
    try:
    connection = psycopg2.connect( database = "swyao_CBS",
user = "nswhay", password = "nswhay", host='db.cs.wm.edu',
port='5432')
    except StandardError, e:
    print(str(e))
    exit

    cur = connection.cursor()
    try:
    cur.execute(request_str)
    except StandardError, e:
    print(str(e))

    arr = cur.fetchall()

    cur.close()
    connection.close()
    return arr

def input_to_db(request_str):
    try:
    connection = psycopg2.connect( database = "swyao_CBS",
user = "nswhay", password = "nswhay", host='db.cs.wm.edu',
port='5432')
        except StandardError, e:
```

```python
        print(str(e))
        exit

    cur = connection.cursor()
    try:
    cur.execute(request_str)
    except StandardError, e:
    print(str(e))

    connection.commit()

    cur.close()
    connection.close()
    return

def unique_room_request(crn, room, timeslots, weekday,
req_list, write_file):

    for req in req_list:
    if crn == req[0]:

            #write_file.write(crn + " " + room + " " +
str(timeslots) + "\n")
            request = "insert into eventCopy values(" + crn +
", 0, 'class');"

            input_to_db(request)

            if weekday == "MWF":
                for i in mondays:
                    date = '2017-0' + i
                    for time in timeslots:
                        update = "update timesCopy set
event_id=" + crn + " where room_id='" + room + "' and
date='" + date + "' and time ='" + time + "';"
                        input_to_db(update)
                for i in wednesdays:
                    date = '2017-0' + i
                    for time in timeslots:
                        update = "update timesCopy set
event_id=" + crn + " where room_id='" + room + "' and
date='" + date + "' and time ='" + time + "';"
                        input_to_db(update)
                for i in fridays:
                    date = '2017-0' + i
```

```
                        for time in timeslots:
                            update = "update timesCopy set
event_id=" + crn + " where room_id='" + room + "' and
date='" + date + "' and time ='" + time + "';"
                            input_to_db(update)
            if weekday == "TR":
                for i in tuesdays:
                    date = '2017-0' + i
                    for time in timeslots:
                        update = "update timesCopy set
event_id=" + crn + " where room_id='" + room + "' and
date='" + date + "' and time ='" + time + "';"
                        input_to_db(update)
                for i in thursdays:
                    date = '2017-0' + i
                    for time in timeslots:
                        update = "update timesCopy set
event_id=" + crn + " where room_id='" + room + "' and
date='" + date + "' and time ='" + time + "';"
                        input_to_db(update)
            req_list.remove(req)
            break
    return req_list


def float_to_time(number):
    hour = int(number)
    minute_str = ""
    if number > hour:
    minute_str = "30"
    else:
    minute_str = "00"

    if (hour == 8 or hour == 9):
    hour_str = "0" + str(hour)
    else:
    hour_str = str(hour)

    return hour_str + ":" + minute_str

def create_timeslots(start_time, duration):
    end = start_time + duration

    i = start_time
    arr = []
    while (i < end):
```

```
        arr.append(float_to_time(i))
        i += 0.5

        #print(arr)
        return arr

def build_where_string(position_list, value_list):
        listkey = ["building=", "room_number=", "capacity>=",
"projector=", "visualizer=", "(whiteboard=", "outlets>="]
        str_return = "where "

        total_length = len(position_list)
        if total_length == 0:
        return ""

        for i in range(0, total_length - 1):
        str_return += listkey[position_list[i]] +
str(value_list[i]) + " and "

        str_return += listkey[position_list[total_length - 1]]
+ value_list[total_length - 1] + ";"

        return str_return

        # building = req[1] #value is string
        # room_number = req[2] #value is string
        # capacity = int(req[6]) # field is 'capacity'; value
is an integer
        # projector = req[7] # field is 'projector'; value is
'YES' in database
        # visualizer = req[8] # field is 'visualizer'; value
is 'YES' or 'NO' in database
        # board = req[9] # field is 'whiteboard'; value is
'CHALKBOARD' or 'WHITEBOARD' or 'BOTH'
        # outlets = req[10] # field is 'outlets'; value is an
integer

def make_query_string(req):
        # crn, building, room_num, start time, duration,
weekdays, capacity, projector, visualizer, board type,
outlets
        # ['25639', 'ISC', 'NULL', 13.0, 1.0, 'MWF', '26',
'0', '1', '0', '3']
        building = req[1]  # value is string
        room_number = req[2]  # value is string
```

```python
    capacity = int(req[6])  # field is 'capacity'; value
is an integer
    projector = req[7]  # field is 'projector'; value is
'YES' in database
    visualizer = req[8]  # field is 'visualizer'; value is
'YES' or 'NO' in database
    board = req[9]  # field is 'whiteboard'; value is
'CHALKBOARD' or 'WHITEBOARD' or 'BOTH'
    outlets = req[10]  # field is 'outlets'; value is an
integer

    position_list = []
    value_list = []
    if building != "NULL":
    position_list.append(0)
    value_list.append("\'" + building + "\'")
    if room_number != "NULL":
    position_list.append(1)
    value_list.append("\'" + room_number + "\'")
    if capacity != "NULL":
    position_list.append(2)
    value_list.append(int(capacity))
    if projector != "NULL":
    position_list.append(3)
    if int(projector) == 0:
        value_list.append("'NO'")
    else:
        value_list.append("'YES'")
    if visualizer != "NULL":
    position_list.append(4)
    if int(visualizer) == 0:
        value_list.append("'NO'")
    else:
        value_list.append("'YES'")
    if board != "NULL":
    position_list.append(5)
    if int(board) == 0:
        value_list.append("'CHALKBOARD' or
whiteboard='BOTH')")
    else:
        value_list.append("'WHITEBOARD' or
whiteboard='BOTH')")
    if outlets != "NULL":
    position_list.append(6)
    value_list.append(outlets)
```

```
      query = "select * from rooms " +
build_where_string(position_list, value_list)

      return  query


def decrement_restrictions(req):
      building = req[1]  # value is string
      room_number = req[2]  # value is string
      capacity = req[6]  # field is 'capacity'; value is an
integer
      projector = req[7]  # field is 'projector'; value is
'YES' in database
      visualizer = req[8]  # field is 'visualizer'; value is
'YES' or 'NO' in database
      board = req[9]  # field is 'whiteboard'; value is
'CHALKBOARD' or 'WHITEBOARD' or 'BOTH'
      outlets = req[10]  # field is 'outlets'; value is an
integer

      if outlets != "NULL":
      req[10] = "NULL"
      return req
      if room_number != "NULL":
      req[2] = "NULL"
      return req
      if building != "NULL":
      req[1] = "NULL"
      return req
      if board != "NULL":
      req[9] = "NULL"
      return req
      if visualizer != "NULL":
      req[8] = "NULL"
      return req
      if projector != "NULL":
      req[7] = "NULL"
      return req
      if capacity != "NULL":
      req[6] = "NULL"
      return req

#------------------------------------------------------------
------------------------------------------------------------
```

```python
room_requests = {}
all_requests = []
fr = open("input.txt", "r")
for request in fr:
    request = request.strip()
    request = request.split(',')
    request[3] = float(request[3])
    request[4] = float(request[4])
    all_requests.append(request)

    # crn, building, room_num, start time, duration,
weekdays, capacity, projector, visualizer, board type,
outlets
    if request[1] != "NULL" and request[2] != "NULL":
    specific_room = request[1] + " " + request[2]
    new_request = [request[0], request[3], request[4],
request[5]]
    if specific_room in room_requests:
        room_requests[specific_room].append(new_request)
    else:
        room_requests[specific_room] = [new_request]

fr.close



print("ALL REQUESTS:")
for thing in all_requests:
    print(thing)



fw = 0#open("output.txt", "w")
for room_id, value in room_requests.items():
    # value = crn, start, duration, weekday
    if len(value) == 1:
    crn = value[0][0]
    weekday = value[0][3]
    timeslot = create_timeslots(value[0][1], value[0][2])
    unique_room_request(crn, room_id, timeslot, weekday,
all_requests, fw)
    else:
    mwf_list = []
    tth_list = []
    for request in value:
```

```python
            if request[3] == "MWF":
                mwf_list.append(request)
            if request[3] == "TR":
                tth_list.append(request)

    if len(mwf_list) == 1:
        crn = mwf_list[0][0]
        weekday = mwf_list[0][3]
        timeslot = create_timeslots(mwf_list[0][1],
mwf_list[0][2])
        unique_room_request(crn, room_id, timeslot,
weekday, all_requests, fw)
    elif len(mwf_list) > 1:
        sorted(mwf_list, key = lambda x: x[1])

        i = 0
        a = 1
        while(i + 1 < len(mwf_list)):
            cur_req = mwf_list[i]
            cur_endtime = cur_req[1] + cur_req[2]
            next_req = mwf_list[i + a]
            next_starttime = next_req[1]

            while (next_starttime <= cur_endtime and a <
len(mwf_list) - 1 - i):
                a+=1
                next_req = mwf_list[i + a]
                next_starttime = next_req[1]

            if a == len(mwf_list) - 1 - i: # reached end
of list
                if next_starttime > cur_endtime:

                    crn_next = next_req[0]
                    weekday_next = next_req[3]
                    timeslot_next =
create_timeslots(next_req[1], next_req[2])
                    unique_room_request(crn_next,
room_id, timeslot_next, weekday_next, all_requests, fw)

                crn = cur_req[0]
                weekday = cur_req[3]
                timeslot = create_timeslots(cur_req[1],
cur_req[2])
                unique_room_request(crn, room_id, timeslot,
```

```
weekday, all_requests, fw)

            i = i + a
            a = 1


    if len(tth_list) == 1:
        crn = tth_list[0][0]
        weekday = tth_list[0][3]
        timeslot = create_timeslots(tth_list[0][1],
tth_list[0][2])
        unique_room_request(crn, room_id, timeslot,
weekday, all_requests, fw)
    elif len(tth_list) > 1:
        sorted(tth_list, key = lambda x: x[1])

        i = 0
        a = 1
        while(i + 1 < len(tth_list)):
            cur_req = tth_list[i]
            cur_endtime = cur_req[1] + cur_req[2]
            next_req = tth_list[i + a]
            next_starttime = next_req[1]

            while (next_starttime <= cur_endtime and a <
len(tth_list) - 1 - i):
                a+=1
                next_req = tth_list[i + a]
                next_starttime = next_req[1]

            if a == len(tth_list) - 1 - i: # reached end
of list
                if next_starttime > cur_endtime:

                    crn_next = next_req[0]
                    weekday_next = next_req[3]
                    timeslot_next =
create_timeslots(next_req[1], next_req[2])
                    unique_room_request(crn_next,
room_id, timeslot_next, weekday_next, all_requests, fw)

            crn = cur_req[0]
            weekday = cur_req[3]
            timeslot = create_timeslots(cur_req[1],
cur_req[2])
```

```
                unique_room_request(crn, room_id, timeslot,
weekday, all_requests, fw)

                i = i + a
                a = 1


for req in all_requests:

    query = make_query_string(req)
    print("QUERY IS: " + query)
    tups = request_from_db(query)

    found_placement_flag = 0

    while (found_placement_flag == 0):

    while (len(tups) == 0):
        req = decrement_restrictions(req)
        print(req)
        query = make_query_string(req)
        tups = request_from_db(query)

    for tup in tups:
        # ('MORTON 1', 'MORTON', '1', 'YES',
'CHALKBOARD', 'YES', 10, 40)
        timeslots = create_timeslots(req[3], req[4])
        check_array = []
        if req[5] == "MWF":
            date = '2017-0' + mondays[0]
            for time in timeslots:
                check_str = "select * from timesCopy
where room_id='" + tup[0] + "' and date='" + date + "' and
time ='" + time + "' and event_id is null;"

check_array.append(len(request_from_db(check_str)))
        else:
            date = '2017-0' + tuesdays[0]
            for time in timeslots:
                check_str = "select * from timesCopy
where room_id='" + tup[0] + "' and date='" + date + "' and
time ='" + time + "' and event_id is null;"

check_array.append(len(request_from_db(check_str)))

        if sum(check_array) == len(timeslots):
```

```
                    crn = req[0]
                    weekday = req[5]
                    room_id = tup[0]
                    unique_room_request(crn, room_id, timeslots,
weekday, all_requests, fw)
                    found_placement_flag = 1
                    break

        if found_placement_flag == 0:
            tups = []

#fw.close()

print("ALL REQUESTS:")
for thing in all_requests:
    print(thing)
print("ROOM_REQUESTS:")
print(room_requests)
```

APPENDIX B
SELECT *

swyao_CBS=> select * from event limit 10;
```
 event_id | reserver_id |  type   |              info
----------+-------------+---------+-----------------------------
40000 |   930847092 | student |
25208 |           0 | class   | Intro to Africana Studies
25209 |           0 | class   | Intro to Africana Studies
24194 |           0 | class   | Intro to Africana Studies
25639 |           0 | class   | AfrAmer Hist since Emncptn
20159 |           0 | class   | History of Europe since 1715
23754 |           0 | class   | History of Europe since 1715
25678 |           0 | class   |
25210 |           0 | class   | Caribbean Lang & Identity
25728 |           0 | class   | Medieval African History
(10 rows)
```

swyao_CBS=> select * from times where event_id is not null limit 10;
```
        date     | time  |  room_id   | event_id | day
------------+-------+------------+----------+-----
 2017-04-11 | 10:00 | MORTON 37  |    25209 | T
 2017-04-11 | 10:30 | MORTON 37  |    25209 | T
 2017-04-11 | 14:00 | MORTON 238 |    24194 | T
 2017-04-18 | 10:30 | MORTON 37  |    25209 | T
 2017-04-18 | 14:00 | MORTON 238 |24194 | T
 2017-04-25 | 10:00 | MORTON 37  |    25209 | T
 2017-01-19 | 10:00 | MORTON 37  |    25209 | R
 2017-03-31 | 09:00 | JBLAIR 201 | 25472 | F
 2017-01-24 | 10:00 | MORTON 37  |    25209 | T
 2017-01-24 | 14:30 | MORTON 238 |24194 | T
(10 rows)
```

swyao_CBS=> select * from reserver limit 10;
```
 reserver_id | permission
-------------+------------
           0 |          0
   930847092 |          3
           2 |          2
           1 |          1
           3 |          3
   930906996 |          3
```

swyao_CBS=> select * from rooms limit 10;
```
  room_id   | building | room_number | projector | whiteboard | visualizer | outlets | capacity
------------+----------+-------------+-----------+------------+------------+---------+----------
 MORTON 1   | MORTON   | 1           | YES       | CHALKBOARD | YES        |      10 |       40
 MORTON 20  | MORTON   | 20          |           | YES        | CHALKBOARD | YES     |      26 |
```

70
| MORTON 37 | MORTON | 37 | YES | CHALKBOARD | YES | | 10 |
38
| MORTON 38 | MORTON | 38 | YES | WHITEBOARD | NO | 12 | 38
| MORTON 39 | MORTON | 39 | YES | WHITEBOARD | YES | 12 | 38
| MORTON 40 | MORTON | 40 | YES | CHALKBOARD | YES | | 10 |
40
| MORTON 102 | MORTON | 102 | YES | WHITEBOARD | YES | 10 | 30
| MORTON 201 | MORTON | 201 | YES | BOTH | YES | 16 | 42
| MORTON 202 | MORTON | 202 | YES | CHALKBOARD | YES | | 8 |
41
| MORTON 203 | MORTON | 203 | YES | CHALKBOARD | YES | | 8 |
40
(10 rows)

COUNTS:

swyao_CBS=> select count(*) from times;
 count

 189176
(1 row)

swyao_CBS=> select count(*) from rooms;
 count

      68
(1 row)

swyao_CBS=> select count(*) from event;
 count

  1740
(1 row)

swyao_CBS=> select count(*) from reserver;
 count

      9
(1 row)

Appendix C:

```
select * from rooms " + build_where_string(position_list,
value_list)
update timesCopy set event_id=" + crn + " where room_id='" +
room + "' and date='" + date + "' and time ='" + time + "';
insert into eventCopy values(" + crn + ", 0, 'class');


 $sql = "SELECT event_id FROM times WHERE room_id='";
                $sql .= $_GET["room"];
                $sql .= "' AND (date >= '2017-04-17' AND date
<= '2017-04-21') ORDER BY date, time;";
                $result = pg_query($sql) or die('Query failed:
' . pg_last_error());


$sql = "BEGIN;";
          $sql .= "UPDATE times SET event_id=null WHERE
event_id=$event_id;";
          $sql .= "DELETE FROM event WHERE
event_id=$event_id;";
          $sql .= "COMMIT;";
                $result = pg_query($sql) or die('Query failed:
' . pg_last_error());


$query = "SELECT * FROM rooms";
     $result = pg_query($query) or die('Query failed: ' .
pg_last_error());



// Connecting, selecting database
          $dbconn = pg_connect("host=db.cs.wm.edu
dbname=swyao_CBS user=nswhay password=nswhay")
          or die('Could not connect:' . pg_last_error());
          $timeList = $_POST["time_list"];
          $info = $_POST["info"];
          $room = $_POST["room"];
          $reserver = $_POST["reserver_id"];

          // Set event_id to max of existing event ids +1
          $getEventIdSql = "SELECT MAX(event_id)+1 FROM
event;";
          $getEventIdresult = pg_query($getEventIdSql) or
die('Query failed: ' . pg_last_error());
          $event_id = pg_fetch_array($getEventIdresult, null,
PGSQL_NUM)[0];


          // SQL insert new reserver and new event
```

```php
        $sql = "BEGIN;";
        // Only insert reserver if not exist
        $checkUserSql = "SELECT count(*) FROM reserver WHERE
reserver_id=" .$reserver. ";";
        $checkUserResult = pg_query($checkUserSql) or
die('Query failed: ' . pg_last_error());
        if (pg_fetch_array($checkUserResult, null,
PGSQL_NUM)[0] == 0) {
        $sql .= "INSERT INTO reserver VALUES(" . $reserver .
",3);";
        }

        $sql .= "INSERT INTO event VALUES(" . $event_id . ","
. $reserver . ",'student','" . $info ."');" ;
        $sql .= "COMMIT;";
        $result = pg_query($sql) or die('Query failed: ' .
pg_last_error());


$sql = "BEGIN;";
        $sql .= "UPDATE times SET event_id=" . $event_id . "
";
        $sql .= "WHERE room_id='" .$room. "' AND time='"
.$time. "' AND date ='" .$date."';";
        $sql .= "COMMIT;";
        $result = pg_query($sql) or die('Query failed: ' .
pg_last_error());

 $query = "SELECT * FROM event WHERE type='student'";
        $result = pg_query($query) or die('Query failed: ' .
pg_last_error());

// Connecting, selecting database
        $dbconn = pg_connect("host=db.cs.wm.edu
dbname=swyao_CBS user=nswhay password=nswhay")
            or die('Could not connect:' . pg_last_error());
        $sql = "SELECT * FROM rooms WHERE ";

        //filter projectors
        if ($_POST["projector"] == "true") {
            $sql .= "projector = 'YES'";
        } else {
            // prepare sql with "AND" for further filters
            $sql .= "(projector = 'YES' OR projector =
'NO')";
        }
        //filter boards
        if ($_POST["chalkboard"] == "true") {
```

```php
            if ($_POST["whiteboard"] == "true") {
            $sql .= " AND whiteboard = 'BOTH'";
            } else {
            $sql .= " AND whiteboard = 'CHALKBOARD'";
            }
        } else {
            if ($_POST["whiteboard"] == "true") {
            $sql .= " AND whiteboard = 'WHITEBOARD'";
            }
        }
        //filter visualizers
        if ($_POST["visualizer"] == "true") {
            $sql .= " AND visualizer = 'YES'";
        }
        //filter outlets
        $min_outlets = (is_numeric($_POST["min_outlets"]) ?
(int)$_POST["min_outlets"] : 0);
        $sql .= " AND outlets >= ".$min_outlets;
        //filter capacity
        $min_cap = (is_numeric($_POST["min_cap"]) ?
(int)$_POST["min_cap"] : 0);
        $sql .= " AND capacity >= ".$min_cap;
        $sql .= ";";

        $result = pg_query($sql) or die('Query failed: ' .
pg_last_error());


$query = pg_query($dbcon, "select * from rooms;");
```

Appendix D

In order to use our webapp, first navigate to http://www.cs.wm.edu/~yhe04/CBS/home.html. Once there, you will be presented with our home screen. To search by classrooms, click on the "Search by Classrooms" button on the top bar. From this page, simply type in the classroom you want to look at, and if it's in our database it will show up. Click on any room id to be taken to the reservation page. Here you will see a table. Click on any checkbox then put your reservation name and 930 number into the boxes below. Submit the request to finalize the selection. You will be taken to a confirmation screen. The checkboxes should turn red.

The "Search by Features" works similarly. Checking the respective boxes searches by the feature checked. This, however, is not automatic so you must click search rooms. From there the process is the same for reserving a room.

To cancel an event, go to "Confirmed Reservations". The searchbox there works the same as in "Search by Classrooms", but it searches on event titles instead. Click cancel next to the reservation you wish to delete. This confirmation screen prompts you for your 930 number. Enter it to delete it.

"Schedule a Class" is for administrative uses. The administration can have professors enter prefered rooms or features on their own time. Each submit adds one entry to a file. When the administration is ready, they click administrator login and enter their id. (The id is 0000 for demonstration purposes). This will run our algorithm and populate the timesCopy and eventCopy tables with the provided information.