

BrownNow

A Current Events Application for Brown University

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1. Introduction

Brown University has an existing events notification system: events.brown.edu. It is professionally designed and has some nice features, such as Google Calendar and Facebook integration. However, it has several drawbacks. It is not optimized for mobile, does not allow for personalization, and the user must click in and out of the event listing to read the description of the event. The screen is also very dense. These factors lead to a tedious user experience. Many campus staff members send event notifications directly to our e-mail inboxes, perhaps concerned that we would never see these events on events.brown.edu (because we probably do not use the site often).

BrownNow is designed to accomplish three goals:

1. Provide a high-quality experience for users.
2. Provide a fast and intuitive interface for event authors.
3. Provide a reliable, easy-to-understand and maintain code environment.

This paper will discuss the technologies used, the interface design, the backend architecture, and details about the implementation.

2. Technologies Used

Many frameworks exist for web development (Ruby On Rails, Django, etc.). These frameworks provide leverage and power for the developer. However, they can take considerable amounts of time to learn and master. BrownNow was written

without the use of frameworks, with the goal being that a university student or CS staff member can quickly read, understand, and work with the code base.

The backend is written in PHP (a very easy language to understand with excellent documentation and numerous web-oriented library functions), and uses a MVC design pattern. MySQL is being used as the database, but Postgres can easily be swapped in if desired. The frontend is implemented in pure HTML, CSS, and JavaScript. JQuery is used lightly to provide some UX enhancement. The site itself is running on an Apache web server (known for reliability and uptime). These choices have produced a durable, easy-to-maintain application.

3. Interface Design

The User Interface

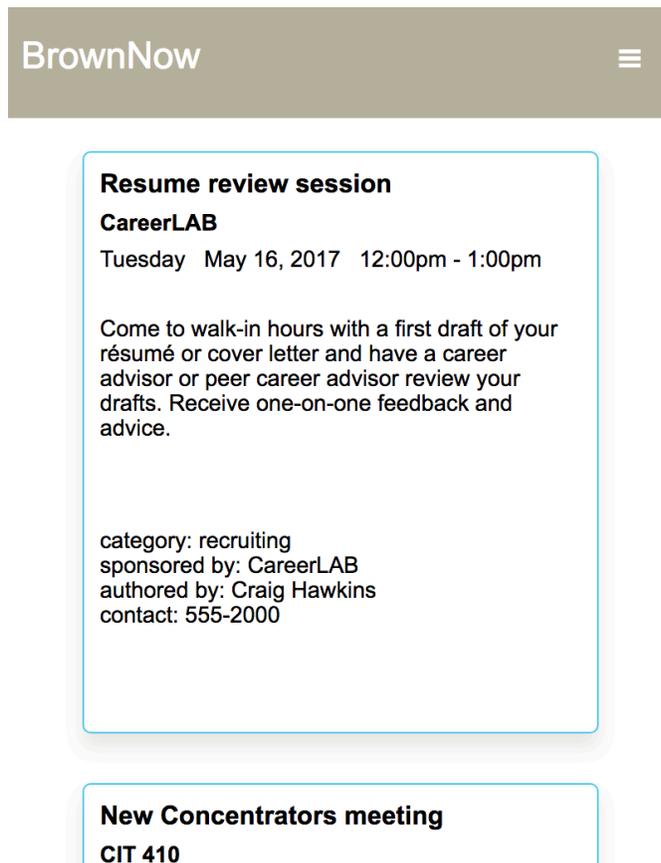
The key features of the user interface are simplicity of use, mobile optimization, and personalization.

When a user visits the site from a desktop, they will see a broad view of events, organized in date order:

The screenshot shows the 'BrownNow' website interface. At the top, there is a header with the text 'BrownNow' on the left and a hamburger menu icon on the right. Below the header is a grid of six event cards, arranged in two rows and three columns. Each card has a title, location, date and time, a description, and contact information.

Event Title	Location	Date & Time	Description	Category	Sponsor	Author	Contact
Resume review session	CareerLAB	Tuesday May 16, 2017 12:00pm - 1:00pm	Come to walk-in hours with a first draft of your résumé or cover letter and have a career advisor or peer career advisor review your drafts. Receive one-on-one feedback and advice.	recruiting	CareerLAB	Craig Hawkins	555-2000
New Concentrators meeting	CIT 410	Thursday May 18, 2017 12:00pm - 1:00pm	Informational meeting for new CS concentrators. Welcome aboard! We will be on hand to talk about the program, how you can participate in research, and how you can become a TA. Pizza and soda will be served.	computer science	C.S. dept	Craig Hawkins	555-2000
Frisbee Marathon	Nelson Center Field	Friday May 19, 2017 1:00pm - 6:00pm	We will be playing frisbee all afternoon and making teams for the frisbee league.	sports: intramural		Craig Hawkins	555-2000
Resume reviews for seniors	CareerLab	Friday May 19, 2017 1:00pm - 2:00pm	Our staff will be available to discuss and help you improve your resumes, and give you tips on interviewing and job search.	recruiting	CareerLab	Craig Hawkins	555-2000
Democracy in Latin America	Smith Buonano 106	Saturday May 20, 2017 11:30am - 1:00pm	Lecture on recent development in Latin American democracy by leading professor from Yale, Dan Hindemith.	politics	Political Science dept.	Craig Hawkins	555-2000
Star Wars Movie Night	MacMillan Hall 105	Saturday May 20, 2017 8:00pm - 11:00pm	Tonight we are showing the original 1977 Star Wars. Come see Luke Skywalker and The Rebels battle Darth Vader and The Empire. Free admission and free popcorn!	film/movies	Brown Film Club	Craig Hawkins	555-2000

However, on a mobile device the application will responsively adjust to the smaller screen size:



Users can easily use the swipe gesture to scroll through the events. All of the information for an event appears on the event tile, and requires no clicking or tapping. With a quick glance, the user can quickly determine if the event is of interest to him or her. This design has been user tested and has been very well received by Brown students.

Personalization allows the user to filter out events they don't care about, see only the events they do care about, and save events to their personal saved section. These features greatly improve the signal-to-noise ratio for the user (a very common problem for general notification systems). I will illustrate and discuss the details of these features next.

In order to provide personalization, the user must register an account. This is a fast, straightforward process:

Register

first name

last name

email

password

password

Register

Register

first name

last name

email

required

password

At least 8 characters.

password

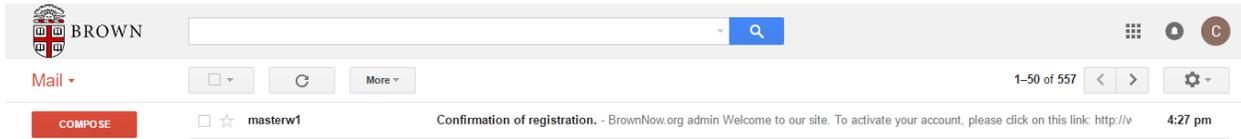
required

Register

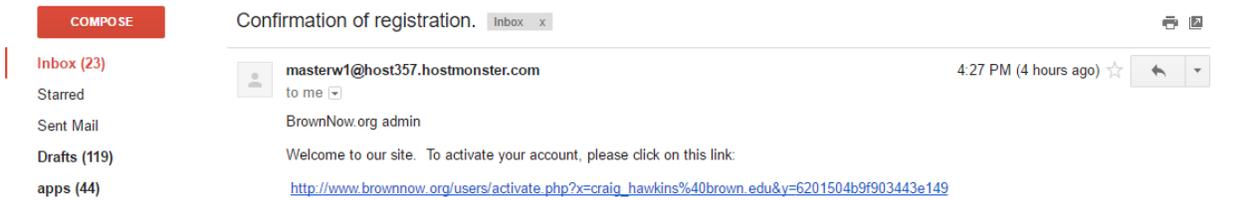
If a user makes a mistake, they do not have to re-type all of their data.

If the user makes a mistake, they are presented with helpful messages, and they do not have to retype all of their data. Additionally, the registration form fits nicely on a mobile device.

To prevent fraudulent registration, a confirmation e-mail is sent to the user:



The user must click on the link provided in the e-mail to activate their account:



Signing in is a straightforward process, and if the user has forgotten their password, the system will e-mail it to them:

Sign In

email

password

[I forgot my password](#)

Password Recovery

Enter the Brown email address associated with your BrownNow account. Your password will be sent to this address.

email

An SSL certificate is used to send sensitive data securely using https:



Upon sign in, users are taken to their general view, which shows all of the events in date order:

A screenshot of the BrownNow user interface. At the top, there is a header bar with the text "BrownNow" and a hamburger menu icon. Below the header, there are three tabs: "General" (which is underlined), "Filtered", and "Saved". The main content area displays a single event card with a light blue border. The event card contains the following text:

Resume review session
CareerLAB
Tuesday May 16, 2017 12:00pm - 1:00pm

Come to walk-in hours with a first draft of your résumé or cover letter and have a career advisor or peer career advisor review your drafts. Receive one-on-one feedback and advice.

category: recruiting
sponsored by: CareerLAB
authored by: Craig Hawkins
contact: 555-2000

save

If the user finds the event interesting, they can press the save button. The interface will let them know they have successfully saved the event, and will place the event in their saved section:

Resume review session
CareerLAB
Tuesday May 16, 2017 12:00pm - 1:00pm

Come to walk-in hours with a first draft of your résumé or cover letter and have a career advisor or peer career advisor review your drafts. Receive one-on-one feedback and advice.

category: recruiting
sponsored by: CareerLAB
authored by: Craig Hawkins
contact: 555-2000

unsave **Saved** ✓

The user has saved the event.

Resume review session
CareerLAB
Tuesday May 16, 2017 12:00pm - 1:00pm

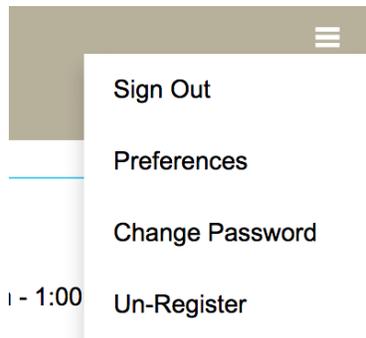
Come to walk-in hours with a first draft of your résumé or cover letter and have a career advisor or peer career advisor review your drafts. Receive one-on-one feedback and advice.

category: recruiting
sponsored by: CareerLAB
authored by: Craig Hawkins
contact: 555-2000

unsave **Saved** ✓

The event is now in the user's saved section.

The preferences section allows the user to choose which categories of events will appear in their filtered feed:



In this example, the user wants only computer science and recruiting events to appear in his/her filtered feed:



Choose which categories you would like to appear in your filtered feed.

- art
- camping/outdoors
- charity
- comedy
- computer science
- dance
- debate
- economics
- film/movies
- food
- fraternities
- health/wellness/social support
- politics
- recruiting

As one can see, the filtered feed contains only recruiting and computer science events:

BrownNow 

General Filtered Saved

Resume review session 149
CareerLAB
Tuesday May 16, 2017 12:00pm - 1:00pm

Come to walk-in hours with a first draft of your résumé or cover letter and have a career advisor or peer career advisor review your drafts. Receive one-on-one feedback and advice.

category: recruiting
sponsored by: CareerLAB
authored by: Craig Hawkins
contact: 555-2000

[unsave](#) **Saved** ✓

New Concentrators meeting 118
CIT 410
Thursday May 18, 2017 12:00pm - 1:00pm

Informational meeting for new CS concentrators. Welcome aboard! We will be on hand to talk about the program, how you can participate in research, and how you can become a TA. Pizza and soda will be served.

category: computer science
sponsored by: C.S. dept
authored by: Craig Hawkins
contact: 555-2000

[save](#)

This is a key feature of the interface; the user can ignore the 97% of events they are not interested in and see the 3% they are interested in.

Users can change their password or unregister at any time:

The screenshot shows the 'Change Password' form within the BrownNow app. At the top, there is a header with the app name 'BrownNow' and a menu icon. Below the header are three tabs: 'General', 'Filtered', and 'Saved'. The main title of the form is 'Change Password'. It contains three input fields: 'old password', 'new password', and another 'new password' field. At the bottom of the form is a dark blue button labeled 'Change Password'.

The screenshot shows the 'Un-Register' form within the BrownNow app. At the top, there is a header with the app name 'BrownNow' and a menu icon. Below the header are three tabs: 'General', 'Filtered', and 'Saved'. The main title of the form is 'Un-Register'. It contains two input fields: 'email' and 'password'. At the bottom of the form is a dark blue button labeled 'Un-Register'.

Thus the user has a full-featured, secure, personalized event notification experience that is optimized for mobile devices.

The Author Interface

The persons authoring events are busy professionals such as career counselors, athletic directors, department staff members, etc. To ensure event authors enjoy and want to work with the application, the interface has been designed to be fast and intuitive. This section will describe and illustrate the power and efficiency of the interface.

Upon sign-in, the author is taken to their events dashboard. Here they can see their events, and edit, archive, or delete them with a simple button click:

Event ID	Visible	# Saved	Date / Time	Title / Location	Description	Category	Sponsor	
149	Y	19	May 16, 2017 12:00pm - 1:00pm	Resume review session CareerLAB	Come to walk-in hours with a first draft of your résumé or cover letter and have a career advisor or peer career advisor review your drafts. Receive one-on-one feedback and advice.	recruiting	CareerLAB	edit archive delete
154	Y	17	May 19, 2017 1:00pm - 6:00pm	Frisbee Marathon Nelson Center Field	We will be playing frisbee all afternoon and making teams for the frisbee league.	sports: intramural		edit archive delete
147	Y	16	May 19, 2017 1:00pm - 2:00pm	Resume reviews for seniors CareerLab	Our staff will be available to discuss and help you improve your resumes, and give you tips on interviewing and job search.	recruiting	CareerLab	edit archive delete
11	Y	21	May 20, 2017 11:30am - 1:00pm	Democracy in Latin America Smith Buonano 106	Lecture on recent development in Latin American democracy by leading professor from Yale, Dan Hindemith.	politics	Political Science dept.	edit archive delete
151	Y	10	May 20, 2017 8:00pm - 11:00pm	Star Wars Movie Night MacMillan Hall 105	Tonight we are showing the original 1977 Star Wars. Come see Luke Skywalker and The Rebels battle Darth Vader and The Empire. Free admission and free popcorn!	film/movies	Brown Film Club	edit archive delete

The author can see all of the details of their events on a single dashboard screen.

A unique feature is the saved column, which tells the author how many users have placed the event in their saved space. This can help authors gauge attendance, and if necessary, book a larger room or order more food. The CareerLAB staff particularly liked this feature. They also greatly liked the archive event feature, because it allows them to keep their events dashboard clean and re-use events in the future.

The create event form has been designed to make the event creation process efficient and pleasant. For example, JavaScript widgets enable easy entering of dates and times:

CREATE EVENT

Event Date Start Time End Time

May 2017

Su	Mo	Tu	We	Th	Fr	Sa
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

Event Sponsor (optional)

Event Description

Visible:

CREATE EVENT

Event Date	Start Time	End Time																																				
<input type="text" value="05/24/2017"/>	<input type="text"/>	<input type="text"/>																																				
Event Title	<div style="border: 1px solid #ccc; padding: 5px;"><div style="border-bottom: 1px solid #ccc; padding-bottom: 2px;">1 : 00 AM ✖</div><table style="width: 100%; border-collapse: collapse;"><thead><tr><th colspan="3">Hour</th><th colspan="3">Minutes</th></tr><tr><th>AM</th><th colspan="2">PM</th><th>00</th><th>05</th><th>10</th></tr></thead><tbody><tr><td>1</td><td>2</td><td>3</td><td>15</td><td>20</td><td>25</td></tr><tr><td>4</td><td>5</td><td>6</td><td>30</td><td>35</td><td>40</td></tr><tr><td>7</td><td>8</td><td>9</td><td>45</td><td>50</td><td>55</td></tr><tr><td>10</td><td>11</td><td>12</td><td></td><td></td><td></td></tr></tbody></table><div style="text-align: right; margin-top: 5px;"><input type="button" value="Set"/></div></div>		Hour			Minutes			AM	PM		00	05	10	1	2	3	15	20	25	4	5	6	30	35	40	7	8	9	45	50	55	10	11	12			
Hour			Minutes																																			
AM	PM		00	05	10																																	
1	2	3	15	20	25																																	
4	5	6	30	35	40																																	
7	8	9	45	50	55																																	
10	11	12																																				
Event Location																																						
Event Category																																						

The CareerLAB staff was delighted with how fast and easy it is to create an event.

Like the User's interface, the authors have the ability to change their password and have their password sent to them if they forget it. Authors also have the ability to update their contact information at any time:

Account Details

Author ID: 1

First Name: Craig

Last Name: Hawkins

Email: craig_hawkins@brown.edu

affiliation

contact

password (for verification, will not be changed)

[Update Account Details](#)

Author adoption is just as important as user adoption in order for the application to be successful. Hence the importance of providing a clean, fast, intuitive interface.

4. Backend Architecture

The backend architecture consists of an interplay between PHP code and a SQL database, with Apache as the web server. State is maintained via PHP session variables. The schema of the database is as shown:

Authors

#	Name	Type
1	author_id 🔑	int(11)
2	first_name	varchar(30)
3	last_name	varchar(30)
4	email	varchar(60)
5	password	varchar(20)
6	affiliation	varchar(70)
7	contact	varchar(100)

Categories

#	Name	Type
1	category_id 🔑	int(4)
2	category_description	varchar(60)

Events

#	Name	Type
1	event_id 🔑	int(11)
2	author_id	int(11)
3	event_date	date
4	start_time	int(4)
5	end_time	int(4)
6	event_title	varchar(45)
7	location	varchar(45)
8	description	varchar(240)
9	category_id	int(4)
10	sponsor	varchar(45)
11	visible	varchar(1)
12	archived	varchar(1)

Filters

#	Name	Type
1	user_id 🔑	int(8)
2	category_id 🔑	int(4)

Saves

#	Name	Type
1	user_id 🔑	mediumint(8)
2	event_id 🔑	int(11)

Users

#	Name	Type
1	user_id 🔑	mediumint(8)
2	first_name	varchar(20)
3	last_name	varchar(30)
4	email	varchar(60)
5	password	varchar(20)
6	activation_code	varchar(20)
7	registration_date	datetime

The schema is designed to support efficient and easy joins. The Filters and Saves relations obviate multi-valued attributes.

The PHP code operates in a model-view-control environment. Depending upon user interaction, the backend code queries the database, filters information, blocks errant or malicious behavior, and serves data and web page rendering code to the client.

5. Implementation Details

To promote modularity and avoid code redundancy, the code is divided into dozens of scripts and HTML fragments. These scripts and fragments are then assembled as needed. In the example below (from the home page script), the *require* statements are bringing in data processing functions and HTML code:

```
<?php
    session_start();
    $documentTitle = "Brown Now - Home Page";

    if($_SESSION['setScrollValue'] == true) {
        $_SESSION['scrollValue'] = 0;
    } else {
        $_SESSION['setScrollValue'] = true;
    }

    require './utilities/functions.php';
    require "./utilities/head_00.html";
    require "./utilities/logo.html";
    require "./utilities/dropdown_menu_00.html";
    require "./utilities/body_fragment_00.html";
    queryDatabase();
    require "./utilities/footer_00.html";
?>
```

The `queryDatabase()` function gets the credentials to access the database (1). It then selects of the events that the authors have marked visible, and that are no older than one day prior to the current date (2). The query results are sorted by date and time. Joins are used to gather all of the pertinent data for each event. The script then uses an include statement to render a discrete HTML code block for each event (3):

```

<?php
//FUNCTIONS FOR THIS SCRIPT
(1) function queryDatabase() {
    require "./utilities/site_credentials.php";

    //GET ALL OF THE GENERAL EVENTS
(2) $query = "SELECT * FROM events NATURAL JOIN authors NATURAL JOIN categories
        WHERE visible = 'Y'
        AND DATE(event_date) >= DATE(CURDATE() - 1)
        ORDER BY event_date, start_time";
    $result = mysqli_query($dbc, $query);

    while ($row = mysqli_fetch_assoc($result)) {
        $authorId = $row['author_id'];
        $eventId = $row['event_id'];
        $eventDay = screenFormatDay($row['event_date']);
        $eventDate = screenFormatDate($row['event_date']);
        $startTime = screenFormatTime($row['start_time']);
        $endTime = screenFormatTime($row['end_time']);
        $eventTitle = $row['event_title'];
        $location = $row['location'];
        $description = $row['description'];
        $category = $row['category'];
        $sponsor = $row['sponsor'];
        $visible = $row['visible'];
        $archived = $row['archived'];
        $authorFirstName = $row['first_name'];
        $authorLastName = $row['last_name'];
        $authorEmail = $row['email'];
        $affiliation = $row['affiliation'];
        $contact = $row['contact'];
        $categoryId = $row['category_id'];
        $categoryDescription = $row['category_description'];

        $sponsorString = '';
        if (strlen($sponsor) > 0) {
            $sponsorString = 'sponsored by: '.$sponsor.'  
';
        }
(3) include './index_view_01.php';
    }
}
?>

```

The HTML code below gets rendered to the screen once for each event, with the data specific to each event inserted by PHP. Hence, in this context, PHP is serving as a templating engine:

```

<div class="event">
    <div style="margin-bottom: 7px; font-size:115%; font-weight:bold; color:black;">
        <?php echo $eventTitle; ?>
        <br />
    </div>

    <div style="margin-bottom: 7px; font-weight:bold">
        <?php echo $location; ?>
    </div>

    <div style="margin-bottom:27px">
        <?php echo $eventDay.' &nbsp;&nbsp;&nbsp;'.$eventDate.' &nbsp;&nbsp;&nbsp;'.$startTime.' - '.$endTime; ?>
    </div>

    <div style="margin-bottom:27px">
        <?php echo $description; ?>
    </div>

    <div style="position: absolute; bottom: 60px">
        category: <?php echo $categoryDescription; ?><br />
        <?php echo $sponsorString; ?>
        authored by: <?php echo $authorFirstName.' '.$authorLastName; ?><br />
        contact: <?php echo $contact; ?>
    </div>
</div>

```

Besides functioning as a templating agent, PHP also functions as a controller. In the example shown below, the PHP code will redirect away an un-credentialed user:

```

<?php
    session_start();
    //guard against oblique entry
    if (!isset($_SESSION['userId'])) {
        header("Location: ../");
        exit();
    }

```

In the following example, a prepared statement is used to guard against SQL injection:

```

//GET ONLY THOSE EVENTS WHOSE CATEGORY IS IN THE USER'S FILTERED LIST
$query = "SELECT * FROM events NATURAL JOIN authors NATURAL JOIN categories
        WHERE visible = 'Y'
        AND DATE(event_date) >= DATE(CURDATE() - 1)
        AND category_id IN
        (SELECT category_id FROM filters
        WHERE user_id = :userId)
        ORDER BY event_date, start_time";

$stmt = $conn->prepare($query);
$stmt->bindValue(':userId', $userId);
$stmt->execute();
$rows = $stmt->fetchAll();

if ($stmt->rowCount() == 0) {
    $_SESSION['queryResultMessage'] = 'You currently do not have any filtered events.';
    include 'filtered_view_02.php';
}

```

An example of an HTML fragment used to render a page:

```
<!DOCTYPE html><!-- head_00.html -->
<html lang="en">
<head>
  <title><?php echo $documentTitle ?></title>
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <link rel="stylesheet" type="text/css" href="//brownnow.org/utilities/css_user_base.css">
  <link rel="stylesheet" type="text/css" href="//brownnow.org/utilities/css_user_without_top_links.css">
  <link rel="stylesheet" type="text/css" href="//brownnow.org/utilities/css_user_forms_01.css">
  <script src="https://ajax.googleapis.com/ajax/libs/jquery/3.1.1/jquery.min.js"></script>
  <script type="text/javascript" src="/utilities/functions.js"></script>
</head>

<body>
  <div id="page">
    <div id="header">
```

Code fragments like these are assembled together to build pages.

The code for the authors section of the site uses the same coding style:

```
$statement = $conn->prepare($query);
$statement->bindValue(':authorId', $authorId);
$statement->execute();
$rows = $statement->fetchAll();

$counter = 1;

foreach ($rows as $row) {
  //make the rows alternate background colors
  $counter = $counter + 1;
  if ($counter % 2 == 0) {
    $backgroundColor = "rgb(217, 211, 201)";
  } else {
    $backgroundColor = "white";
  }

  $eventId = $row['event_id'];
  $visible = $row['visible'];
  $eventDate = $row['event_date'];
  $startTime = $row['start_time'];
  $endTime = $row['end_time'];
  $eventTitle = $row['event_title'];
  $eventLocation = $row['location'];
  $eventDescription = $row['description'];
  $categoryId = $row['category_id'];
  $categoryDescription = $row['category_description'];
  $eventSponsor = $row['sponsor'];
  $visible = $row['visible'];
  $archived = $row['archived'];

  //get the number of saves associated with this event
  //(i.e. how many users have this in their saved collection)
  $query = "SELECT count(*) FROM saves
           WHERE event_id = :eventId";
```

```

<tr style="height:80px; min-height:80px; <?php echo "background-color:".$backgroundColor; ?>">
<td class="eventsTableCell" style="padding-left: 15px;"><?php echo $eventId; ?></td><!-- event id -->
<td class="eventsTableCell" style="padding-left: 15px;"><?php echo $visible; ?></td><!-- visible -->
<td class="eventsTableCell" style="padding-left: 15px;"><?php echo $numSaves; ?></td><!-- num saves -->
<td class="eventsTableCell"><?php echo screenFormatDate($eventDate). "<br />".screenFormatTime($startTime). ' - '.screenFormatTime($endTime); ?></td><!-- date.start time, end time -->
<td class="eventsTableCell"><?php echo $eventTitle; <br />'.seventLocation ?></td><!-- title / location -->
<td class="eventsTableCell"><?php echo $eventDescription; ?></td><!-- description -->
<td class="eventsTableCell"><?php echo $categoryDescription; ?></td><!-- category description -->
<td class="eventsTableCell"><?php echo $eventSponsor; ?></td><!-- sponsor -->
<!-- the form buttons: -->
<td style="vertical-align:center;">
<form style="display:inline;" action="../authors/edit_event.php" method="POST" />
<input type="hidden" name="eventId" value="<?php echo $eventId; ?>">
<button class="button" style="width:60px; height:30px;" type="submit" value="0" name="scrollValue" onclick="A(this)">edit</button>
</form>
</td>
<td style="vertical-align:center;">
<form style="display:inline;" action="../authors/archive_event.php" method="POST" />
<input type="hidden" name="eventId" value="<?php echo $eventId; ?>">
<input type="hidden" name="returnPageName" value="events.php">
<button class="button" style="width:60px; height:30px;" type="submit" value="0" name="scrollValue" onclick="A(this)">archive</button>
</form>
</td>
<td style="vertical-align:center;">
<form onsubmit="if(!confirm('Are you sure you want to delete the event?')){event.preventDefault();}" style="display:inline;" action="../authors/delete_event.php" method="POST" />
<input type="hidden" name="eventId" value="<?php echo $eventId; ?>">
<input type="hidden" name="returnPageName" value="events.php">
<button class="button" style="width:60px; height:30px;" type="submit" value="0" name="scrollValue" onclick="A(this)">delete</button>
</form>
</td>
</tr>

```

An event in the Authors dashboard.

6. Conclusion

BrownNow provides a high-quality user experience for users. The interface is clean, optimized for mobile, and allows users to filter out and save events. The authoring interface is fast and intuitive interface, and allows authors to gauge event interest by seeing how many users have placed the event in their saved sections. The code base is clean, straightforward, and framework-free, allowing for a student or staff member to easily understand and maintain the code environment.

Good future developments for the project would be allowing users to send events of interest to Google Calendar, and allowing friends to “scout” for each other by placing interesting events into their friend’s saved sections. Allowing users to rate the events they attended and to send these ratings to event authors would also be a nice enhancement.