

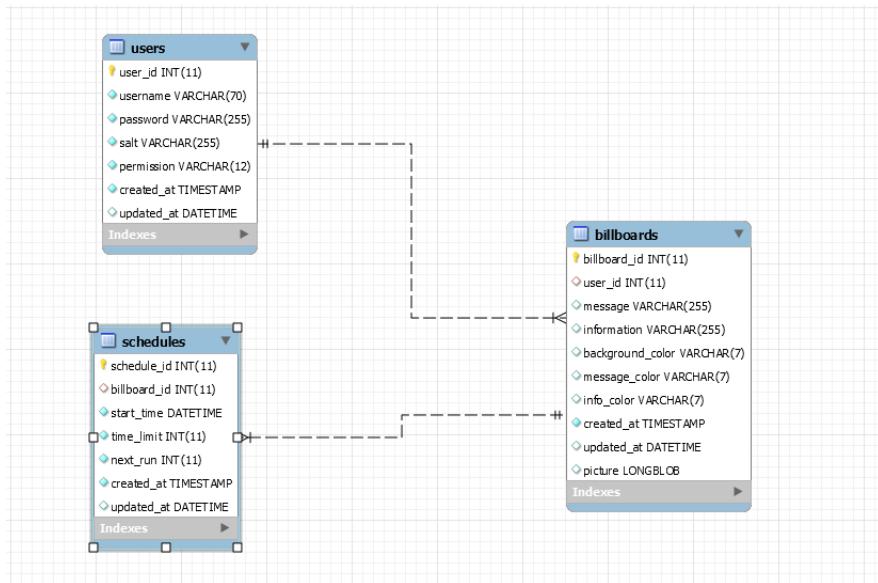
Group 80:
Do Viet Hoang – n10329935
Quoc Huy Nguyen – n10289020

Assignment: Major Project

1. Statement of completeness

1.1. BillboardServer

The Server is a command-line program that allows connection from the control panel and view using socket channel and byte buffer. Its main jobs are interfacing with database, handling requests sent from clients. The database has 3 schemas as followed:



1.2. BillboardControlPanel

It is a GUI application using to create new billboards, modify existing billboards, schedule billboards and maintaining the users' details. The application will display Login Page in the first start up. Users need to enter their username and password to continue and it is the only way to access to the system. The default user has a username and a password is “admin” and “admin” respectively. Administrators will have full of permissions: “Create Billboards”, “Edit Billboards”, “Schedule Billboards” and “Edit Users”.

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1.3. BillboardViewer

It is a GUI application using to display scheduled billboards. The Billboard Viewer connects to a server to retrieve the information about presently scheduled billboard every 15 seconds. If there is no current billboard to display or error occurs when connecting to the server, an error screen will be shown. Users can exit the application by pressing the 'Escape' key on a keyboard or clicking the mouse anywhere on the billboard screen. The presentation of a billboard depends on the number of attributes of that billboard.

2. Statement of contributions

Quoc Huy Nguyen – n10289020:

Implementing Communication Protocol.

Developing Server.

Database Interfacing.

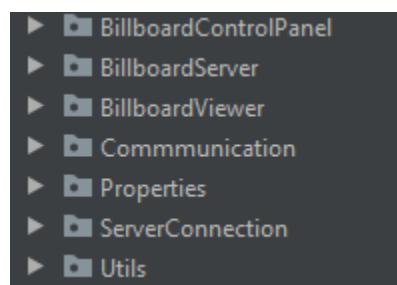
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Designing Billboard Viewer and Billboard Control Panel.

Database Design.

3. Design description

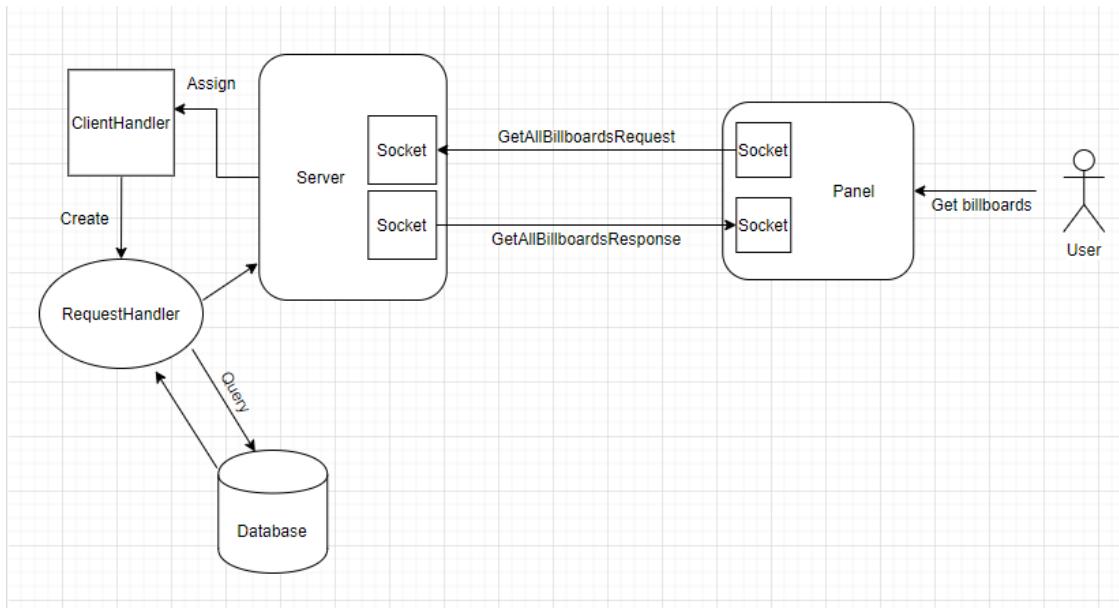
3.1. Overview



The project is divided into 3 main packages: BillboardControlPanel, BillboardServer and BillboardViewer. ServerConnection are for any clients that need to establish connection to server. Utils can be considered as some necessary helpers such as: Format Date, Hashing, etc.

3.2. Communication

This is the most difficult problem in the entire project. Basically, all the nodes communicate with each other by sending string data to byte buffer of socket channel. Each request or response is formatted as a class with private fields (LoginRequestMessage has userName and passWord, ...). It then be converted into bytes and sent to the other node. The receiver first gets the type of the message then created a requestHandler based on that. Diagram below helps you visualize how the communication protocol works at a basic level. Every connection among nodes follows this pattern.



In the example, a user wants to get the list of all billboards. They interact with the Panel, which creates a GetAllBillboardRequest (with token). It then opens the socket channel and sends it to the byte buffer. When server receives the request, it assigns a ClientHandler to check the request type (GetAllBillboardRequest in this case). The ClientHandler will create a RequestHandler based on the request type. For example, for GetAllBillboardRequest, it creates a GetAllBillboardRequestHandler. The handler first validates token, then interfaces with the database using BillboardSchema to retrieve all entries in the billboard table. It then sends back the GetAllBillboardResponse to the panel. However, for all the GetAll...Response, sending all the data entries in one response might get the byte buffer to overflow. Therefore, the handler for this particular type of request will send a series of GetAll...Response, each of which contains only one data entry, and end it with an EndResponse indicating that the communication has finished.

This pattern is applied for almost all of the communications between server and clients.

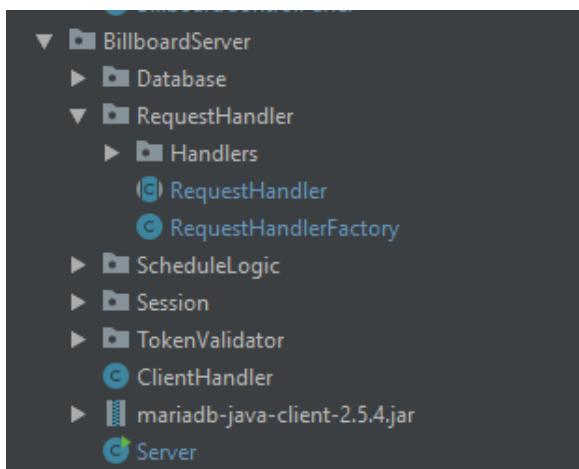
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3.3. Server

Once we have decided the protocol, implementing server is straightforward. Most of the work was to determine what type of request it will be receiving and what database query it needs.



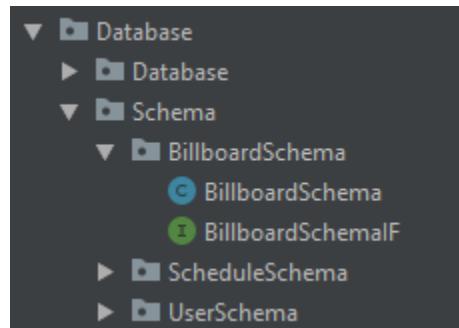
Database: Define database connection and schemas

RequestHandler: Classes representing a process to handle all requests sent from client

ScheduleLogic: Gets all the entries in the schedules schema and return the current billboard to show.

Session: Represent a session with token and expiry.

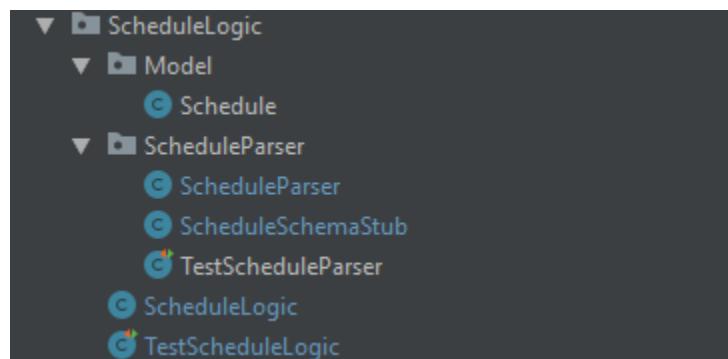
TokenValidator: Handle session and validate token.



The Database class is responsible for database connection. Each schema takes the Database instance as the data source for CRUD methods:

```
public interface ScheduleSchemaIF {  
    ArrayList<HashMap<String, String>> getAllSchedules();  
    int deleteScheduleByBillboard(String billboard_id);  
    int createSchedule(String billboard_id, String startTime, String timeLimit, String nextRun);  
    int editschedule(String schedule_id, String startTime, String timeLimit, String nextRun);  
    int deleteSchedule(String schedule_id);  
}
```

To get the current billboard for the Viewer, we implemented ScheduleLogic class. The idea is to take all the entries from the database as an input and return a null or current billboard id.



Since the ScheduleSchema will return an ArrayList<Hashmap()> which is difficult to interact with, we implemented the ScheduleParser to map all the entries from

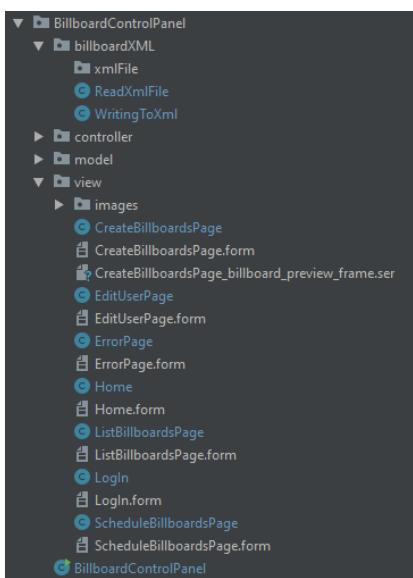
Group 80:

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ArrayList<HashMap> to ArrayList<Schedule>. Once the ScheduleLogic is fully finished, it will be used in the CurrentBillboardRequestHandler.

3.4. Billboard Control Panel



controller: get data from data source and pass it to model or view

model: receive data from controller and store it

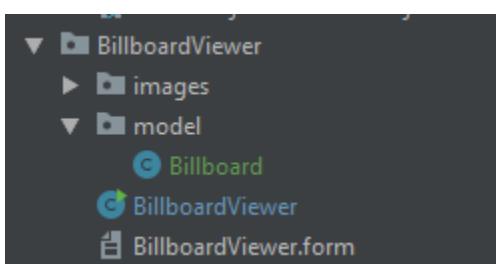
view: display information such as list schedules, list users, list billboards ...

images: store image files to display in view components
xmlFile: store xml File export from application

When the app is executed for the first time, if the server is not available, the class LoginPage will run first. If the server is ready and Billboard Control Panel connects successful, the class LoginPage will be executed with a token passed from server. The token will always be passed from a class to other class to verify user's

information. Then if users log in with valid credentials, the app will dispose LoginPage and execute class HomePage. The class LoginPage, HomePage, CreateBillboardsPage, EditUserPage, ListBillboardsPage and ScheduleBillboardsPage can interact with each other by clicking a suitable button in the application. All the classes above will get the data about users, schedules and billboards stored at the model to display to the screen. Class CreateBillboardsPage also utilizes classes ReadXmlFile and WritingToXml to export and import xml file.

3.5. Billboard Viewer



images: store image files to display in the application

model: store billboard data

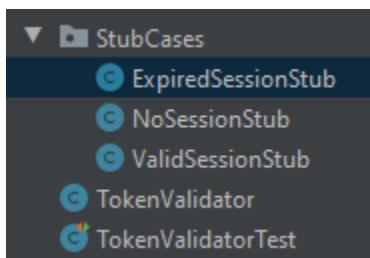
The class BillboardViewer connects to the server and retrieves data about current billboard to display it.

Group 80:
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4. Test-driven development

Since almost every request from panel require server to validate token, we decide to use TDD to implement TokenValidator class. The idea is to give the validator the Session with token and expiry fields and expect it to return an error message or that particular token.

Since the Session would be stored in memory as a static field of the Server class, to test the TokenValidator, we first created some session stubs to represent all the cases we want to test.



Next, we created a test which covers all the possible cases. For the CheckTokenRequest, we expected the TokenValidator to check if any valid token exists. If there is a token and its expired, the validator should also remove it and return error message. For any other request sent from Control Panel, the validator will check the expiry time of the token , if its expired, it should remove the token and return an error message.

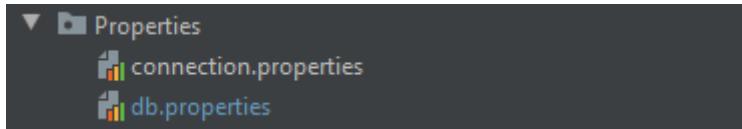
After finalizing all the test cases, we implement the TokenValidator to pass all the tests.

Group 80:
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5. Setup/Installation instructions

5.1. Network configuration

Network information (hostname, port) is stored in the Properties/connection.properties.



Any adjustment should be configured correctly in this file:

```
con.hostname=YOUR_HOSTNAME  
con.port=YOUR_PORT
```

5.2. Database configuration

Database connection is stored in the db.properties.

```
db.url=jdbc:mariadb://localhost:3306/  
db.user=root  
db.password=root  
db.driver=org.mariadb.jdbc.Driver
```

At the server fresh start, it automatically creates 3 tables and a default user with 'admin' as both username and password.

Group 80:

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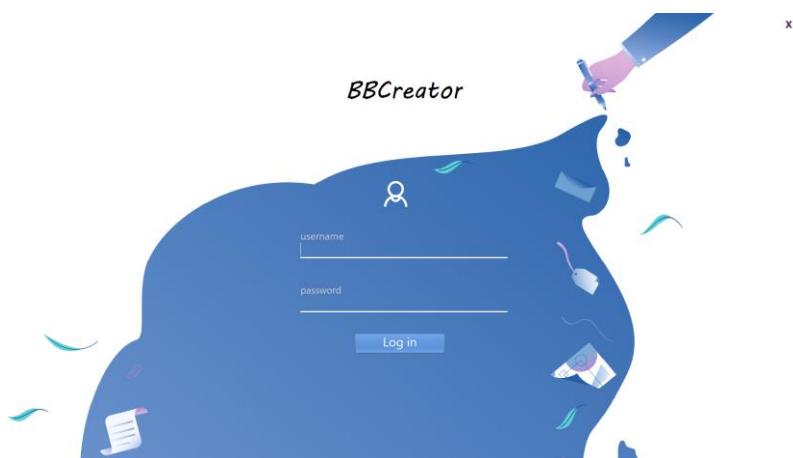
6. Walkthrough

If we run the Viewer or the Panel and the server is closed. An error screen will.



Server is not ready

We run the server and restart the Panel.

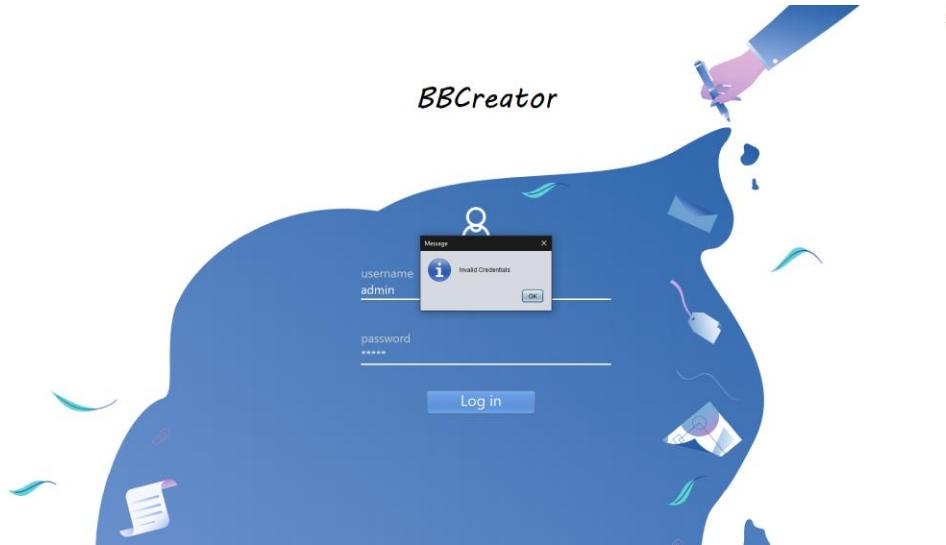


Group 80:

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The default user has a username is “admin” and password is “admin”. An error message will occur when we enters invalid credentials.



Once the credentials are correctly provided, we can access the Home Page.

BBCreator

We ❤ BBCreator !

Welcome to BBCreator !

Start building your own billboard and share it with your friends.

THE #1 BILLBOARD GENERATOR

Create stunning billboards and earn the bragging rights with your friends.

Get Started For Free

Username: admin ID: 1

YOUR DESIGN HERE

YOUR DESIGN HERE

YOUR DESIGN HERE

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The default user has access to all functionalities. Click on “Create Billboards” button in the left panel, we will access the Create Billboard Page.

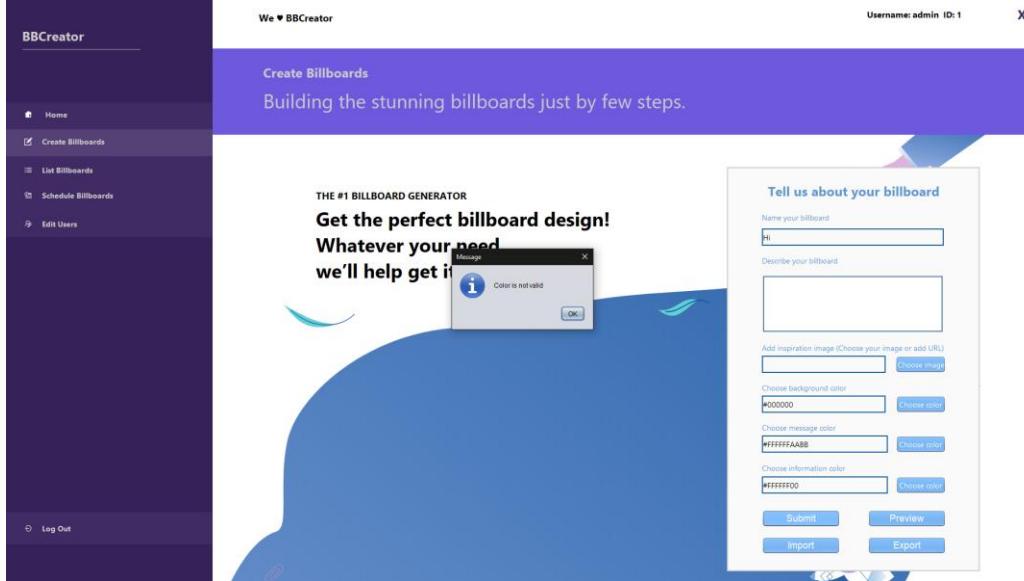
The screenshot shows the BBCreator application interface. On the left, a dark sidebar menu lists "Home", "Create Billboards" (which is checked), "List Billboards", "Schedule Billboards", and "Edit Users". At the bottom of the sidebar is a "Log Out" link. The main content area has a purple header bar with the text "Create Billboards" and "Building the stunning billboards just by few steps.". Below the header is a promotional message: "THE #1 BILLBOARD GENERATOR" and "Get the perfect billboard design! Whatever your need, we'll help get it done." To the right is a form titled "Tell us about your billboard" with fields for "Name your billboard", "Describe your billboard", "Add inspiration image (Choose your image or add URL)", "Choose background color" (hex code #000000), "Choose message color" (hex code #FFFFFF), "Choose information color" (hex code #FFFFFF), and buttons for "Submit", "Preview", "Import", and "Export". The top right corner of the main content area shows the text "Username: admin ID: 1" and a close button (X).

The error message will occur when we do not enter valid value to the form. For example, message field, information field and image field are all empty:

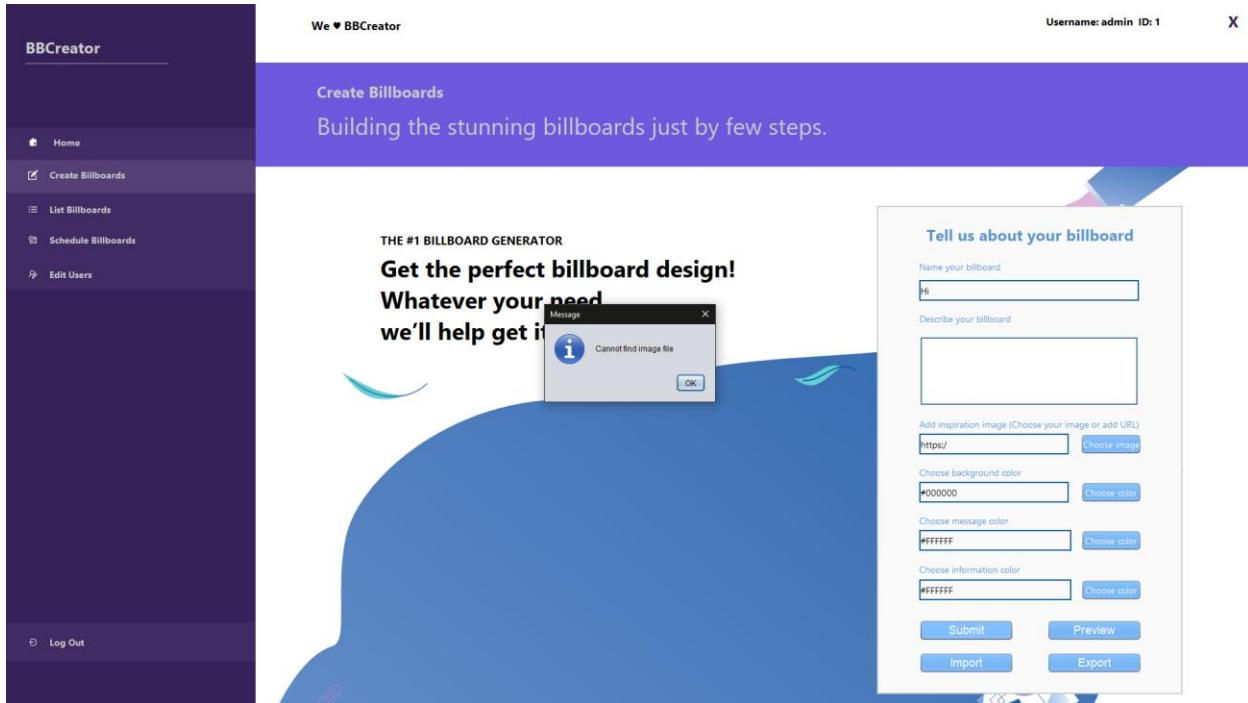
This screenshot is similar to the previous one, showing the BBCreator application's "Create Billboards" page. The sidebar and header are identical. However, a modal dialog box titled "Message" is overlaid on the main content area. The dialog contains an exclamation mark icon and the text "Input enough field to preview billboard". The "OK" button of the dialog is visible at the bottom right. The rest of the page, including the form fields and sidebar, appear normal.

Group 80:
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The color is not valid hex string:



The image is not a valid URL or base64 data:

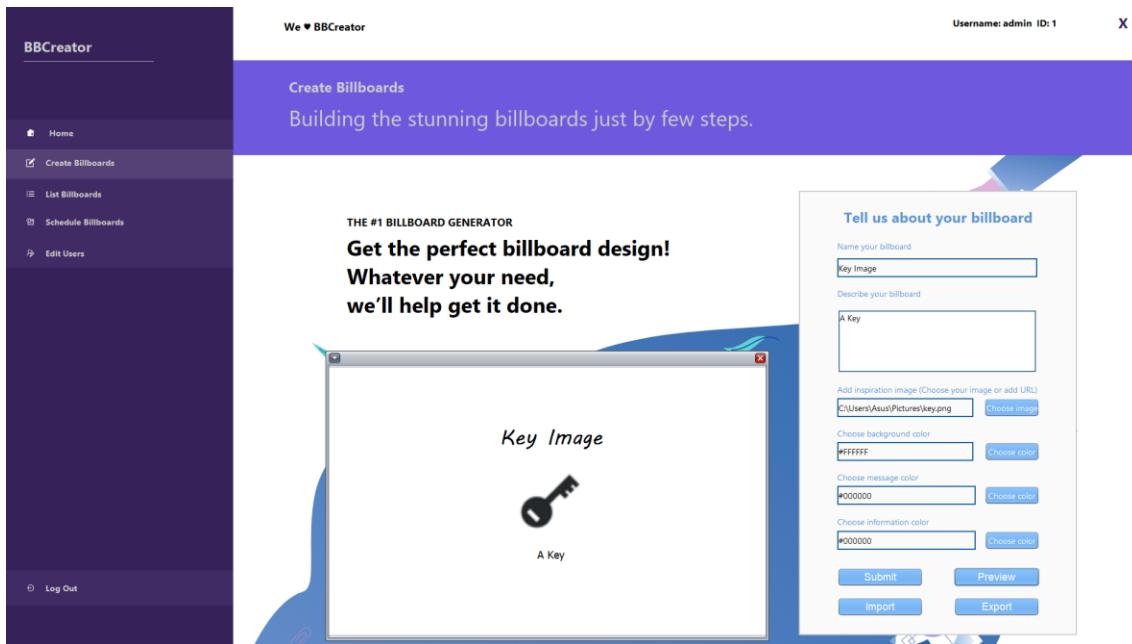


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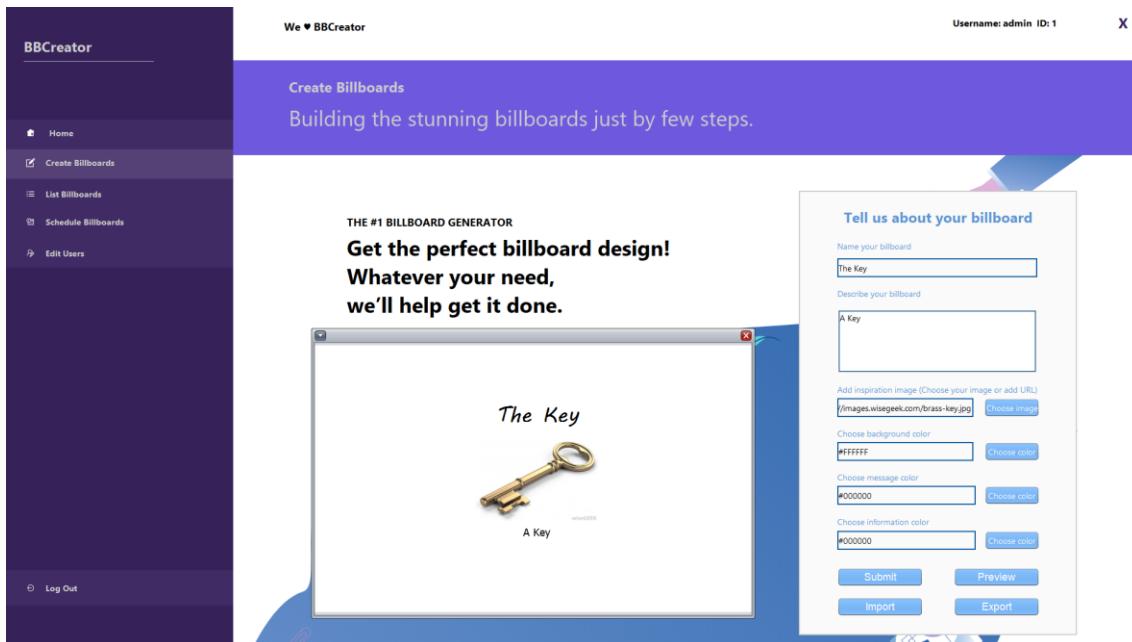
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If we enter valid value to the fields, we can preview the billboard we just created. Below is an example of billboard that takes a picture from my local storage:



Below is an example of billboard that takes a picture from an URL

<https://images.wisegeek.com/brass-key.jpg>



Group 80:

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We can export our billboard to an XML file. The file will be saved in src\main\java\BillboardControlPanel\billboardXML\xmlFile. The xml file name includes billboard message and username of the author.

The image consists of two vertically stacked screenshots of a web-based application named BBCreator.

Screenshot 1 (Top): This screenshot shows the "Create Billboards" page. On the left is a sidebar with navigation links: Home, Create Billboards (which is selected), List Billboards, Schedule Billboards, and Edit Users. On the right, there's a main content area with a purple header bar containing the text "Building the stunning billboards just by few steps.". Below this is a section titled "THE #1 BILLBOARD GENERATOR" with the subtext "Get the perfect billboard design! Whatever your need we'll help get it". A central image shows a golden key with the text "The Key" above it and "A Key" below it. A small "Message" dialog box is overlaid on the image, displaying the message "Export successfully!" with an "OK" button. To the right of the image is a form titled "Tell us about your billboard" with fields for "Name your billboard" (set to "The Key"), "Describe your billboard" (set to "A Key"), "Add inspiration image (Choose your image or add URL)" (set to "/images.wisegeek.com/brass-key.jpg"), "Choose background color" (set to "#FFFFFF"), "Choose message color" (set to "#000000"), "Choose information color" (set to "#000000"), and buttons for "Submit", "Preview", "Import", and "Export".

Screenshot 2 (Bottom): This screenshot shows the same "Create Billboards" page. The sidebar and main content area are identical to the first screenshot. However, the central image area now displays an "Open" file dialog box. The dialog shows a list of XML files in the "xmlfile" folder: "All custom colours1.xml", "Billboard with custom background and default-coloured message1.xml", "Billboard with message and picture with data attribute1.xml", and "The Key.xml". The file "The Key.xml" is selected. The "File Name:" field is set to "The Key.xml" and the "File Type:" dropdown is set to "xml files (*.xml)". The "Open" and "Cancel" buttons are visible at the bottom of the dialog.

Group 80:
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We can also import and load a billboard from xml file. Below, we use the file we just exported: The key1.xml.

The screenshot shows the BBCreator application interface. On the left, a sidebar menu includes 'Home', 'Create Billboards' (which is selected), 'List Billboards', 'Schedule Billboards', and 'Edit Users'. At the bottom of the sidebar is a 'Log Out' link. The main content area has a purple header bar with the text 'We ❤ BBCreator' and 'Username: admin ID: 1'. Below this is a blue banner with the text 'Create Billboards' and 'Building the stunning billboards just by few steps.' A central callout box says 'THE #1 BILLBOARD GENERATOR' and 'Get the perfect billboard design! Whatever your need, we'll help get it done.' It features a small window preview of a billboard titled 'The Key' with a golden key icon. To the right is a form titled 'Tell us about your billboard' with fields for 'Name your billboard' (set to 'The Key'), 'Describe your billboard' (set to 'A Key'), 'Add Inspiration image (Choose your image or add URL)' (set to '/images.wisegeek.com/brass-key.jpg'), 'Choose background color' (set to '#FFFFFF'), 'Choose message color' (set to '#000000'), 'Choose information color' (set to '#000000'), and buttons for 'Submit', 'Preview', 'Import', and 'Export'.

This is how a xml file looks:

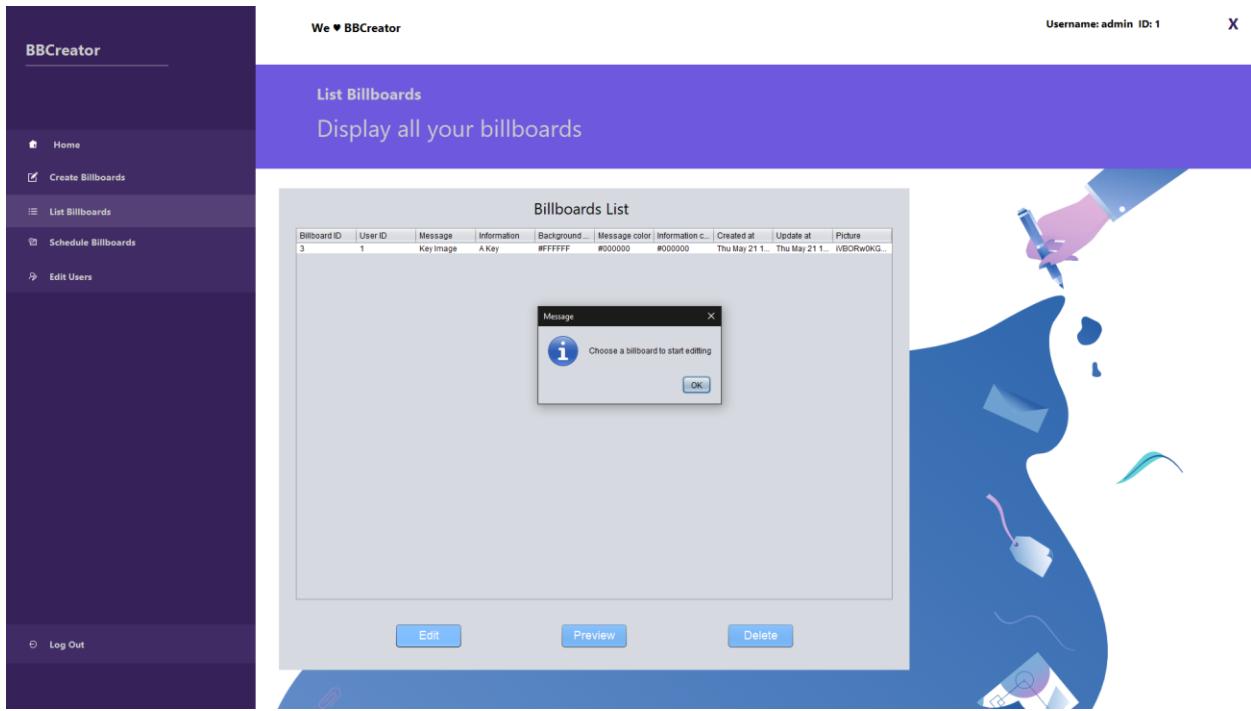
A screenshot of a web browser window showing the XML code for the billboard. The address bar indicates the file is located at 'D:\2.QUIT.CAB 302 JAVA\JavaMajorProject\src\main\java\Billboard\ControlPanel\billboard\file\The Key1.xml'. The XML content is as follows:

```
<?xml version="1.0" encoding="UTF-8"?>
<billboard background="#FFFFFF">
<message colour="#FFFF00">The Key</message>
<image url="https://images.wisegeek.com/brass-key.jpg"/>
<information colour="#000000">A Key</information>
</billboard>
```

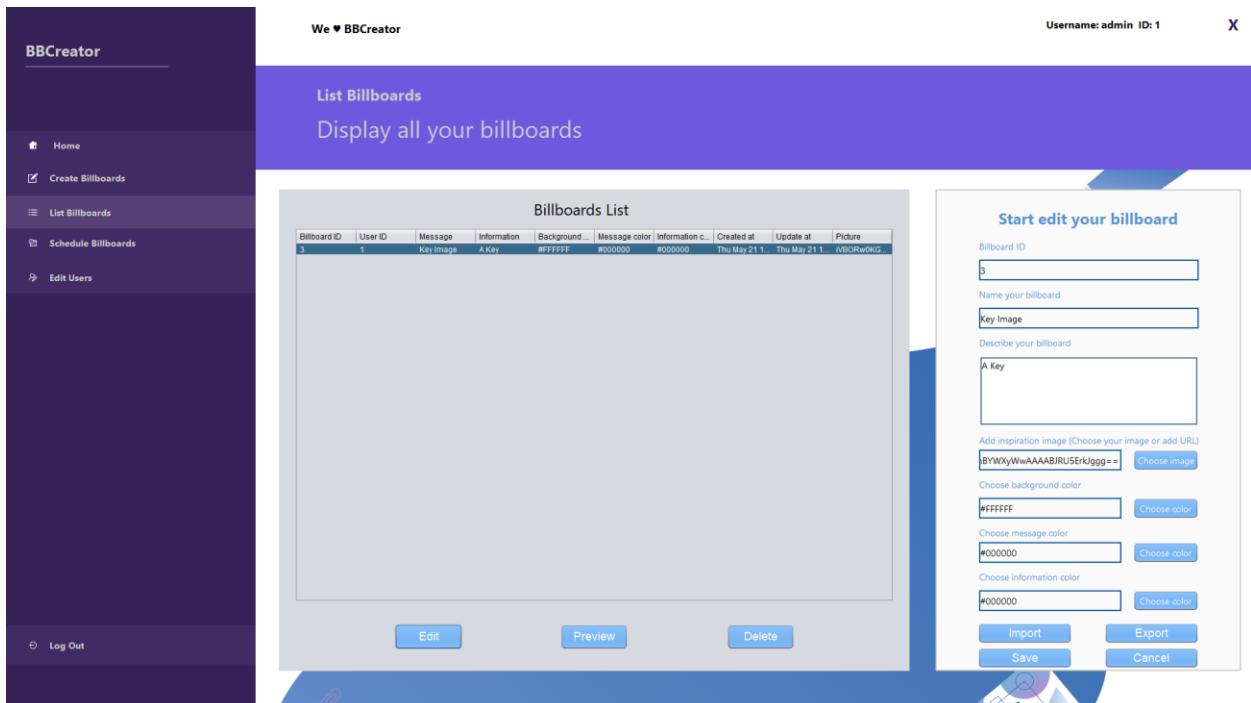
The browser window is part of a Windows desktop environment, with the taskbar visible at the bottom showing various application icons.

Group 80:
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Now, we go to the List Billboards Page. There is an error message when we click on Edit or Delete button without choosing any billboard.



We choose a billboard and click Edit button. An edit panel will appear.



Group 80:
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Same as creating billboards, some errors will occur when we enter invalid content to the fields.

The screenshot shows the BBCreator application interface. On the left is a sidebar with a dark purple background and white text, containing links for Home, Create Billboards, List Billboards, Schedule Billboards, Edit Users, and Log Out. The main area has a blue header bar with the text "We ❤ BBCreator" and "Username: admin ID: 1". Below the header is a purple banner with the text "List Billboards" and "Display all your billboards". A modal window titled "Billboards List" is open, showing a table with one row of data. The table columns are: Billboard ID, User ID, Message, Information, Background, Message color, Information c..., Created at, Updated at, and Picture. The data row is: 3, 1, Key Image, A Key, #FFFFFF, #000000, #000000, Thu May 21 11, Thu May 21 11, https://en... . Below the table is a "Message" dialog box with an exclamation icon and the text "Color is not valid". At the bottom of the modal are three buttons: "Edit", "Preview", and "Delete". To the right of the modal is a "Start edit your billboard" form. This form includes fields for Billboard ID (with placeholder "3"), Name your billboard (empty), Key Image (with placeholder "A Key"), and a large text area for Describ[e] your billboard (empty). There are also several color selection boxes and buttons for Add inspiration image, Choose background color, Choose message color, Choose information color, Import, Export, Save, and Cancel. A decorative graphic of a person holding a pen is visible on the right side of the form.

Here, I will edit the old image to the image from this URL: <https://encrypted-tbn0.gstatic.com/images?q=tbn%3AANd9GcRnJpjV1NMgfeaTJEScQsrMtu2fazRPznoUm4pWGJSnIJeQ29er&usqp=CAU>. This is the screen after editing successfully.

The screenshot shows the BBCreator application interface, similar to the previous one but with a successful edit. The sidebar and header are identical. The main area now displays a "Billboards List" modal with a table showing the same data as before, but the "Key Image" column now contains a thumbnail image of a key. Below the table is a "Message" dialog box with an exclamation icon and the text "Success". At the bottom are "Edit", "Preview", and "Delete" buttons. To the right is the "Start edit your billboard" form, which now shows the edited key image in the "Key Image" field. The "Describ[e] your billboard" text area contains the text "A Key". The "Import", "Export", "Save", and "Cancel" buttons are at the bottom. A decorative graphic of a person holding a pen is visible on the right side of the form.

Group 80:

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Since we are using an administration account with full permission, we can delete any billboard we want.

The screenshot shows the BBCreator application interface. On the left is a sidebar with navigation links: Home, Create Billboards (which is selected), List Billboards, Schedule Billboards, Edit Users, and Log Out. The main content area has a purple header bar with the text "We ❤ BBCreator" and "Username: admin ID: 1". Below the header is a blue bar with the text "List Billboards" and "Display all your billboards". The central part of the screen shows a "Billboards List" table with one row of data. At the bottom of the table is a "Message" modal window with the text "Delete successfully!" and an "OK" button. Below the table are three buttons: "Edit", "Preview", and "Delete". To the right of the main content is a decorative graphic of a hand holding a pen over a blue abstract shape.

Now, go back to the Create Billboards Page to create some billboards for next step:

The screenshot shows the BBCreator application interface. The sidebar is identical to the previous screenshot. The main content area has a purple header bar with the text "We ❤ BBCreator" and "Username: admin ID: 1". Below the header is a blue bar with the text "Create Billboards" and "Building the stunning billboards just by few steps.". The central part of the screen features a large callout text: "THE #1 BILLBOARD GENERATOR", "Get the perfect billboard design!", "Whatever your need", and "we'll help get it". Below this text is a "Message" modal window with the text "Add successfully!" and an "OK" button. To the right is a form titled "Tell us about your billboard" with various input fields: "Name your billboard" (Default-coloured message), "Describe your billboard" (Custom-coloured information text), "Add inspiration image (Choose your image or add URL)" (with a URL field and "Choose image" button), "Choose background color" (with a color picker set to #FFFFFF), "Choose message color" (with a color picker set to #000000), "Choose information color" (with a color picker set to #60B9FF), and buttons for "Submit", "Preview", "Import", and "Export".

Group 80:
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Go to the Schedule Billboards Page, the two billboards we just created are not scheduled. We can schedule a billboard by selecting its ID. We start creating schedule for billboard with ID 4:

Group 80:

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Some errors will occur when we enter invalid input:

The screenshot shows the BBCreator application interface. On the left is a sidebar with navigation links: Home, Create Billboards, List Billboards, Schedule Billboards (which is selected), and Edit Users. On the right, the main area has a purple header "Edit Schedule" and "Schedule billboards to be displayed on the Viewers". Below this is a "Schedule List" table for dates from 21-05-2020 to 27-05-2020. A modal window titled "Message" displays the error: "Time limit and next run must be integers". In the bottom right corner of the main area, there is a sidebar labeled "Billboard ID" containing the values 4 and 5.

This screenshot is similar to the one above, showing the BBCreator application. The sidebar and main schedule list are identical. However, the "Schedule your billboard" modal window now displays a different error: "This billboard is not scheduled". The sidebar on the right still shows Billboard IDs 4 and 5.

Group 80:

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Now, we enter a valid input and click Save button. The schedule calendar will appear:

We ♥ BBCreator

Username: admin ID: 1 X

Edit Schedule

Schedule billboards to be displayed on the Viewers

Schedule List

| Time | Schedule ID |
|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 16:15-16:25 | 3 | 00:15-00:25 | 3 | 00:15-00:25 | 3 | 00:15-00:25 | 3 | 00:15-00:25 | 3 | 00:15-00:25 | 3 | 00:15-00:25 | 3 |
| 16:45-16:55 | 3 | 00:45-00:55 | 3 | 00:45-00:55 | 3 | 00:45-00:55 | 3 | 00:45-00:55 | 3 | 00:45-00:55 | 3 | 00:45-00:55 | 3 |
| 17:15-17:25 | 3 | 01:15-01:25 | 3 | 01:15-01:25 | 3 | 01:15-01:25 | 3 | 01:15-01:25 | 3 | 01:15-01:25 | 3 | 01:15-01:25 | 3 |
| 17:45-17:55 | 3 | 01:45-01:55 | 3 | 01:45-01:55 | 3 | 01:45-01:55 | 3 | 01:45-01:55 | 3 | 01:45-01:55 | 3 | 01:45-01:55 | 3 |
| 18:15-18:25 | 3 | 02:15-02:25 | 3 | 02:15-02:25 | 3 | 02:15-02:25 | 3 | 02:15-02:25 | 3 | 02:15-02:25 | 3 | 02:15-02:25 | 3 |
| 18:45-18:55 | 3 | 02:45-02:55 | 3 | 02:45-02:55 | 3 | 02:45-02:55 | 3 | 02:45-02:55 | 3 | 02:45-02:55 | 3 | 02:45-02:55 | 3 |
| 19:15-19:25 | 3 | 03:15-03:25 | 3 | 03:15-03:25 | 3 | 03:15-03:25 | 3 | 03:15-03:25 | 3 | 03:15-03:25 | 3 | 03:15-03:25 | 3 |
| 19:45-19:55 | 3 | 03:45-03:55 | 3 | 03:45-03:55 | 3 | 03:45-03:55 | 3 | 03:45-03:55 | 3 | 03:45-03:55 | 3 | 03:45-03:55 | 3 |
| 20:15-20:25 | 3 | 04:15-04:25 | 3 | 04:15-04:25 | 3 | 04:15-04:25 | 3 | 04:15-04:25 | 3 | 04:15-04:25 | 3 | 04:15-04:25 | 3 |
| 20:45-20:55 | 3 | 04:45-04:55 | 3 | 04:45-04:55 | 3 | 04:45-04:55 | 3 | 04:45-04:55 | 3 | 04:45-04:55 | 3 | 04:45-04:55 | 3 |
| 21:15-21:25 | 3 | 05:15-05:25 | 3 | 05:15-05:25 | 3 | 05:15-05:25 | 3 | 05:15-05:25 | 3 | 05:15-05:25 | 3 | 05:15-05:25 | 3 |

Billboard ID

4
5

Schedule your billboard

Schedule ID: 3

Start time (hh:mm dd-mm-yyyy): 16:15 21-05-2020

Billboard ID: 4

Time limit (minute): 10

Billboard message: Default-coloured message

Nest run (minute): 40

Save Delete Cancel

We can choose a scheduled billboard to edit:

We ♥ BBCreator

Username: admin ID: 1 X

Edit Schedule

Schedule billboards to be displayed on the Viewers

Schedule List

| Time | Schedule ID |
|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 16:15-16:25 | 3 | 00:15-00:25 | 3 | 00:15-00:25 | 3 | 00:15-00:25 | 3 | 00:15-00:25 | 3 | 00:15-00:25 | 3 | 00:15-00:25 | 3 |
| 16:45-16:55 | 3 | 00:45-00:55 | 3 | 00:45-00:55 | 3 | 00:45-00:55 | 3 | 00:45-00:55 | 3 | 00:45-00:55 | 3 | 00:45-00:55 | 3 |
| 17:15-17:25 | 3 | 01:15-01:25 | 3 | 01:15-01:25 | 3 | 01:15-01:25 | 3 | 01:15-01:25 | 3 | 01:15-01:25 | 3 | 01:15-01:25 | 3 |
| 17:45-17:55 | 3 | 01:45-01:55 | 3 | 01:45-01:55 | 3 | 01:45-01:55 | 3 | 01:45-01:55 | 3 | 01:45-01:55 | 3 | 01:45-01:55 | 3 |
| 18:15-18:25 | 3 | 02:15-02:25 | 3 | 02:15-02:25 | 3 | 02:15-02:25 | 3 | 02:15-02:25 | 3 | 02:15-02:25 | 3 | 02:15-02:25 | 3 |
| 18:45-18:55 | 3 | 02:45-02:55 | 3 | 02:45-02:55 | 3 | 02:45-02:55 | 3 | 02:45-02:55 | 3 | 02:45-02:55 | 3 | 02:45-02:55 | 3 |
| 19:15-19:25 | 3 | 03:15-03:25 | 3 | 03:15-03:25 | 3 | 03:15-03:25 | 3 | 03:15-03:25 | 3 | 03:15-03:25 | 3 | 03:15-03:25 | 3 |
| 19:45-19:55 | 3 | 03:45-03:55 | 3 | 03:45-03:55 | 3 | 03:45-03:55 | 3 | 03:45-03:55 | 3 | 03:45-03:55 | 3 | 03:45-03:55 | 3 |
| 20:15-20:25 | 3 | 04:15-04:25 | 3 | 04:15-04:25 | 3 | 04:15-04:25 | 3 | 04:15-04:25 | 3 | 04:15-04:25 | 3 | 04:15-04:25 | 3 |
| 20:45-20:55 | 3 | 04:45-04:55 | 3 | 04:45-04:55 | 3 | 04:45-04:55 | 3 | 04:45-04:55 | 3 | 04:45-04:55 | 3 | 04:45-04:55 | 3 |
| 21:15-21:25 | 3 | 05:15-05:25 | 3 | 05:15-05:25 | 3 | 05:15-05:25 | 3 | 05:15-05:25 | 3 | 05:15-05:25 | 3 | 05:15-05:25 | 3 |

Billboard ID

4
5

Schedule your billboard

Schedule ID: 3

Start time (hh:mm dd-mm-yyyy): 16:15 21-05-2020

Billboard ID: 4

Time limit (minute): 10

Billboard message: Default-coloured message

Nest run (minute): 40

Save Delete Cancel

Group 80:

Do Viet Hoang – n10329935

Quoc Huy Nguyen – n10289020

We start creating schedule for billboard with ID 5:

BBCreator

We ♥ BBCreator

Username: admin ID: 1 X

Edit Schedule

Schedule billboards to be displayed on the Viewers

Schedule List

| 21-05-2020 | | 22-05-2020 | | 23-05-2020 | | 24-05-2020 | | 25-05-2020 | | 26-05-2020 | | 27-05-2020 | |
|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Time | Schedule ID |
| 16:15-16:19 | 4 | 00:15-00:19 | 4 | 00:15-00:19 | 4 | 00:15-00:19 | 4 | 00:15-00:19 | 4 | 00:15-00:19 | 4 | 00:15-00:19 | 4 |
| 16:19-16:25 | 3 | 00:19-00:25 | 3 | 00:19-00:25 | 3 | 00:19-00:25 | 3 | 00:19-00:25 | 3 | 00:19-00:25 | 3 | 00:19-00:25 | 3 |
| 16:55-16:59 | 4 | 00:55-00:59 | 4 | 00:55-00:59 | 4 | 00:55-00:59 | 4 | 00:55-00:59 | 4 | 00:55-00:59 | 4 | 00:55-00:59 | 4 |
| 16:59-17:05 | 3 | 00:59-01:05 | 3 | 00:59-01:05 | 3 | 00:59-01:05 | 3 | 00:59-01:05 | 3 | 00:59-01:05 | 3 | 00:59-01:05 | 3 |
| 17:55-17:59 | 4 | 01:35-01:39 | 4 | 01:35-01:39 | 4 | 01:35-01:39 | 4 | 01:35-01:39 | 4 | 01:35-01:39 | 4 | 01:35-01:39 | 4 |
| 17:39-17:45 | 3 | 01:39-01:45 | 3 | 01:39-01:45 | 3 | 01:39-01:45 | 3 | 01:39-01:45 | 3 | 01:39-01:45 | 3 | 01:39-01:45 | 3 |
| 18:15-18:19 | 4 | 02:15-02:19 | 4 | 02:15-02:19 | 4 | 02:15-02:19 | 4 | 02:15-02:19 | 4 | 02:15-02:19 | 4 | 02:15-02:19 | 4 |
| 18:19-18:25 | 3 | 02:19-02:25 | 3 | 02:19-02:25 | 3 | 02:19-02:25 | 3 | 02:19-02:25 | 3 | 02:19-02:25 | 3 | 02:19-02:25 | 3 |
| 18:55-18:59 | 4 | 02:55-02:59 | 4 | 02:55-02:59 | 4 | 02:55-02:59 | 4 | 02:55-02:59 | 4 | 02:55-02:59 | 4 | 02:55-02:59 | 4 |
| 18:59-19:05 | 3 | 02:59-03:05 | 3 | 02:59-03:05 | 3 | 02:59-03:05 | 3 | 02:59-03:05 | 3 | 02:59-03:05 | 3 | 02:59-03:05 | 3 |
| 19:35-19:39 | 4 | 03:35-03:39 | 4 | 03:35-03:39 | 4 | 03:35-03:39 | 4 | 03:35-03:39 | 4 | 03:35-03:39 | 4 | 03:35-03:39 | 4 |

Schedule your billboard

Schedule ID: 4

Start time (hhmm dd-mm-yyyy): 16:15 21-05-2020

Billboard ID: 5

Time limit (minute): 40

Billboard message: All custom colours

Nest run (minute): 40

Save Delete Cancel

BBCreator

We ♥ BBCreator

Username: admin ID: 1 X

Edit Schedule

Schedule billboards to be displayed on the Viewers

Schedule List

| 21-05-2020 | | 22-05-2020 | | 23-05-2020 | | 24-05-2020 | | 25-05-2020 | | 26-05-2020 | | 27-05-2020 | |
|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Time | Schedule ID |
| 16:15-16:19 | 4 | 00:15-00:19 | 4 | 00:15-00:19 | 4 | 00:15-00:19 | 4 | 00:15-00:19 | 4 | 00:15-00:19 | 4 | 00:15-00:19 | 4 |
| 16:19-16:25 | 3 | 00:19-00:25 | 3 | 00:19-00:25 | 3 | 00:19-00:25 | 3 | 00:19-00:25 | 3 | 00:19-00:25 | 3 | 00:19-00:25 | 3 |
| 16:55-16:59 | 4 | 00:55-00:59 | 4 | 00:55-00:59 | 4 | 00:55-00:59 | 4 | 00:55-00:59 | 4 | 00:55-00:59 | 4 | 00:55-00:59 | 4 |
| 16:59-17:05 | 3 | 00:59-01:05 | 3 | 00:59-01:05 | 3 | 00:59-01:05 | 3 | 00:59-01:05 | 3 | 00:59-01:05 | 3 | 00:59-01:05 | 3 |
| 17:55-17:59 | 4 | 01:35-01:39 | 4 | 01:35-01:39 | 4 | 01:35-01:39 | 4 | 01:35-01:39 | 4 | 01:35-01:39 | 4 | 01:35-01:39 | 4 |
| 17:39-17:45 | 3 | 01:39-01:45 | 3 | 01:39-01:45 | 3 | 01:39-01:45 | 3 | 01:39-01:45 | 3 | 01:39-01:45 | 3 | 01:39-01:45 | 3 |
| 18:15-18:19 | 4 | 02:15-02:19 | 4 | 02:15-02:19 | 4 | 02:15-02:19 | 4 | 02:15-02:19 | 4 | 02:15-02:19 | 4 | 02:15-02:19 | 4 |
| 18:19-18:25 | 3 | 02:19-02:25 | 3 | 02:19-02:25 | 3 | 02:19-02:25 | 3 | 02:19-02:25 | 3 | 02:19-02:25 | 3 | 02:19-02:25 | 3 |
| 18:55-18:59 | 4 | 02:55-02:59 | 4 | 02:55-02:59 | 4 | 02:55-02:59 | 4 | 02:55-02:59 | 4 | 02:55-02:59 | 4 | 02:55-02:59 | 4 |
| 18:59-19:05 | 3 | 02:59-03:05 | 3 | 02:59-03:05 | 3 | 02:59-03:05 | 3 | 02:59-03:05 | 3 | 02:59-03:05 | 3 | 02:59-03:05 | 3 |
| 19:35-19:39 | 4 | 03:35-03:39 | 4 | 03:35-03:39 | 4 | 03:35-03:39 | 4 | 03:35-03:39 | 4 | 03:35-03:39 | 4 | 03:35-03:39 | 4 |

Schedule your billboard

Schedule ID: 4

Start time (hhmm dd-mm-yyyy): 16:15 21-05-2020

Billboard ID: 4

Time limit (minute): 40

Billboard message: All custom colours

Nest run (minute): 40

Save Delete Cancel

Group 80:

Do Viet Hoang – n10329935

Quoc Huy Nguyen – n10289020

Go back to the List Billboards page, with “Edit Billboard” permission, we can delete any billboards even they are presently scheduled or not. We delete 2 billboards and the below screen will appear.

The screenshot shows the BBCreator application interface. On the left is a dark sidebar with navigation links: Home, Create Billboards (selected), List Billboards, Schedule Billboards, Edit Users, and Log Out. The main content area has a purple header "List Billboards" and a sub-header "Display all your billboards". Below is a table titled "Billboards List" with two rows of data. A modal dialog box titled "Message" with the text "Delete successfully!" and an "OK" button is overlaid on the list. At the bottom of the list are three buttons: Edit, Preview, and Delete. To the right of the list is a sidebar titled "Start edit your billboard" containing fields for Billboard ID, Name your billboard, Describe your billboard, Add inspiration image, Choose background color, Choose message color, Choose information color, Import, Export, Save, and Cancel. A small illustration of a person holding a pen is at the bottom right.

Now, go to the Edit Users page. An error will occur when we click Edit or Delete button without selecting an user.

The screenshot shows the BBCreator application interface. The sidebar is identical to the previous one. The main content area has a purple header "Edit Users" and a sub-header "Modify users' information as you wish". Below is a table titled "User List" with one row of data. A modal dialog box titled "Message" with the text "Choose a user to start editing" and an "OK" button is overlaid on the list. At the bottom of the list are three buttons: Edit, Add, and Delete. A large blue graphic of a person writing on a notepad is on the right side of the page.

Group 80:
Do Viet Hoang – n10329935
Quoc Huy Nguyen – n10289020

Now, we try to edit the “admin” account. As we can see, we cannot edit the username:

The screenshot shows the BBCreator application interface. On the left is a sidebar with options: Home, Create Billboards (selected), List Billboards, Schedule Billboards, Edit Users (selected), and Log Out. The main area has a purple header "Edit Users" and a sub-header "Modify users' information as you wish". Below is a "User List" table with one row for "admin". To the right is an "Edit user" dialog. It contains fields for User ID (1), Username (admin), Password (empty), Re-enter password (empty), and checkboxes for Permission: Create Billboards (checked), Edit All Billboards (checked), Schedule Billboards (checked), and Edit Users (unchecked). At the bottom are "Save" and "Cancel" buttons. A blue "Edit" button is visible at the bottom of the User List table.

An error message will appear if the passwords we entered do not match.

This screenshot is similar to the previous one, showing the BBCreator application. The "Edit user" dialog now shows both the "Password" and "Re-enter password" fields filled with three asterisks ("***"). A modal dialog titled "Message" is displayed in the center, containing the text "The password seems wrong" and an "OK" button. The "Edit" button in the User List table is still highlighted in blue.

Group 80:
Do Viet Hoang – n10329935
Quoc Huy Nguyen – n10289020

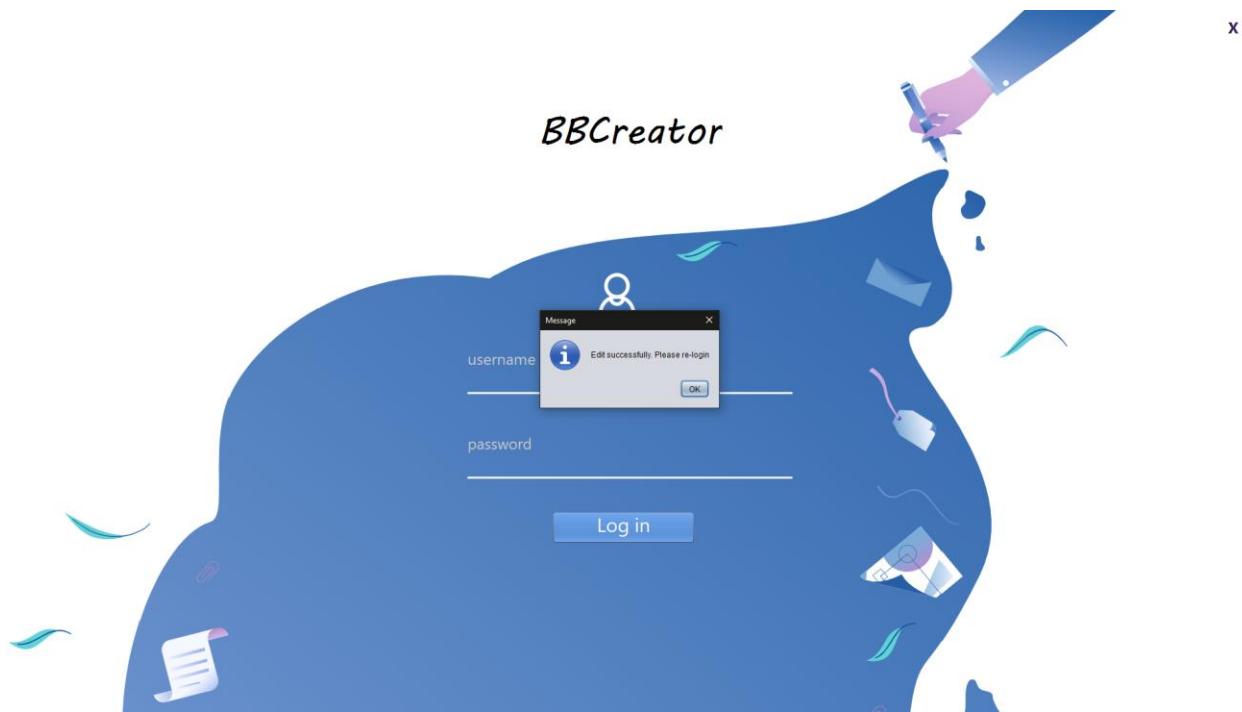
Change the password of “admin” to “1234” and click Save.

The screenshot shows the BBCreator application's user interface. On the left is a sidebar with a dark purple background and white text, containing links for Home, Create Billboards, List Billboards, Schedule Billboards, and Edit Users. The main area has a light blue header with the text "Edit Users" and "Modify users' information as you wish". Below the header is a "User List" table with one row:

| User ID | Username | Permission | Created at | Update at |
|---------|----------|--------------|--------------------------------|-------------------------------|
| 1 | admin | [EB, SB, EU] | Tue May 12 15:00:29 AEST 20... | Mon May 18 23:48:22 AEST 2... |

At the bottom of the list are three buttons: "Edit", "Add", and "Delete". To the right of the list is a modal window titled "Edit user" with fields for User ID (set to 1), Username (set to admin), Password (set to ****), and Re-enter password (set to ****). Under the "Permission" section, checkboxes are checked for "Create Billboards", "Edit All Billboards", and "Schedule Billboards", while "Edit Users" is unchecked. At the bottom of the modal are "Save" and "Cancel" buttons. The overall theme includes a cartoonish hand holding a pen and a notepad.

The application will automatically log out and require a re-login to continue.



Group 80:
Do Viet Hoang – n10329935
Quoc Huy Nguyen – n10289020

Enter “admin” as username and “1234” as password. Go back to Edit User Page. Now, we will try to create new account. An error message will appear if we enter invalid input:

The image consists of two vertically stacked screenshots of the BBCreator application interface.

Screenshot 1 (Top): This screenshot shows the 'Edit Users' page. The 'Create new user' form is open, with the 'Username' field containing 'db'. The 'Password' and 'Re-enter password' fields are empty. Under 'Permission', the 'Create Billboards' checkbox is checked, while 'Edit All Billboards', 'Schedule Billboards', and 'Edit Users' are unchecked. The 'Save' button is highlighted in blue. A modal dialog box titled 'Message' displays the error: 'The password doesn't match.' with an 'OK' button.

Screenshot 2 (Bottom): This screenshot also shows the 'Edit Users' page. The 'Create new user' form has been updated; the 'Username' field now contains '**', and the 'Password' and 'Re-enter password' fields both contain '**'. The 'Permission' checkboxes are all unchecked. The 'Save' button is highlighted in blue. A modal dialog box titled 'Message' displays the error: 'User must have at least 1 permission.' with an 'OK' button.

Group 80:

Do Viet Hoang – n10329935

Quoc Huy Nguyen – n10289020

We create an account with a username is “cb” and password is “cb”:

The screenshot shows the BBCreator application interface. On the left is a dark sidebar with navigation links: Home, Create Billboards, List Billboards, Schedule Billboards, and Edit Users. The main content area has a purple header bar with the text "Edit Users" and "Modify users' information as you wish". Below this is a "User List" table with the following data:

| User ID | Username | Permission | Created at | Updated at |
|---------|----------|------------------|--------------------------------|-------------------------------|
| 1 | admin | [CB, EB, SB, EU] | Tue May 12 16:00:28 AEST 20... | Mon May 18 23:47:06 AEST 2... |
| 3 | cb | [CB] | Mon May 18 23:49:44 AEST 20... | Mon May 18 23:49:44 AEST 2... |

At the bottom of the table are three buttons: "Edit", "Add", and "Delete". The background of the main content area features a blue abstract graphic of a person holding a pen.

Next, we create few more accounts:

| username | password | permission |
|----------|----------|----------------|
| eb | eb | EB |
| sb | sb | SB |
| test | test | CB, EB, SB, EU |

The screenshot shows the BBCreator application interface, similar to the previous one but with more data in the User List table. The sidebar and header are identical. The "User List" table now contains six rows of data:

| User ID | Username | Permission | Created at | Updated at |
|---------|----------|------------------|--------------------------------|-------------------------------|
| 1 | admin | [CB, EB, SB, EU] | Tue May 12 16:00:28 AEST 20... | Mon May 18 23:47:06 AEST 2... |
| 3 | cb | [CB] | Mon May 18 23:49:44 AEST 20... | Mon May 18 23:49:44 AEST 2... |
| 4 | eb | [EB] | Mon May 18 23:50:29 AEST 20... | Mon May 18 23:50:29 AEST 2... |
| 5 | sb | [SB] | Mon May 18 23:50:29 AEST 20... | Mon May 18 23:50:29 AEST 2... |
| 6 | test | [CB, EB, SB, EU] | Mon May 18 23:50:42 AEST 20... | Mon May 18 23:50:42 AEST 2... |

At the bottom of the table are three buttons: "Edit", "Add", and "Delete". The background of the main content area features a blue abstract graphic of a person holding a pen.

Group 80:

Do Viet Hoang – n10329935

Quoc Huy Nguyen – n10289020

Since “admin” is an account with “Edit User” permission, we can delete any account except our own account.

The screenshot shows the BBCreator application interface. On the left is a sidebar with options: Home, Create Billboards, List Billboards, Schedule Billboards, and Edit Users (which is selected). The main area has a purple header "We ❤ BBCreator" and a sub-header "Edit Users" with the sub-instruction "Modify users' information as you wish". Below this is a "User List" table with columns: User ID, Username, Permission, Created at, and Update at. The table contains five rows: 1 (admin), 2 (cb), 3 (eb), 4 (sb), and 5 (test). A modal dialog titled "Message" is displayed, showing an info icon and the text "Delete successfully!". At the bottom of the main area are three buttons: Edit, Add, and Delete. The status bar at the top right shows "Username: admin ID: 1".

This screenshot is similar to the one above, showing the BBCreator application. The sidebar and main header are identical. The "Edit Users" section is active. In the "User List" table, the row for "admin" is selected. A modal dialog titled "Message" is displayed, showing an info icon and the text "Cannot delete your own account". The status bar at the top right shows "Username: admin ID: 1".

Then, we will create some billboards for further test:

Group 80:
Do Viet Hoang – n10329935
Quoc Huy Nguyen – n10289020

The screenshot shows the BBCreator application interface. At the top, there's a header with the text "We ❤ BBCreator" and "Username: admin ID: 1". On the left, a sidebar menu lists "Home", "Create Billboards" (with a checked checkbox), "List Billboards" (selected, indicated by a blue background), "Schedule Billboards", and "Edit Users". Below the menu is a "Log Out" button. The main content area is titled "List Billboards" with the sub-instruction "Display all your billboards". A table titled "Billboards List" displays three rows of data:

| Billboard ID | User ID | Message | Information | Background | Message color | Information c... | Created at | Update at | Picture |
|--------------|---------|------------------|-----------------|------------|---------------|------------------|-----------------|-----------------|------------------|
| 6 | 1 | All custom co... | All custom c... | #8800C0 | #FF9E3F | #3FFFC7 | Thu May 21 1... | Thu May 21 1... | null |
| 7 | 1 | The informa... | The informa... | #855555 | #FFFFFF | #DDDDDD | Thu May 21 1... | Thu May 21 1... | null |
| 8 | 1 | null | null | #FFC457 | #000000 | #000000 | Thu May 21 1... | Thu May 21 1... | https://cloud... |

At the bottom of the table are three buttons: "Edit", "Preview", and "Delete". To the right of the table is a stylized blue illustration of a person's head profile with a pen writing on it.

Log out

The screenshot shows the BBCreator application's login page. The title "BBCreator" is displayed above the form. The form consists of two input fields: "username" and "password", both represented by horizontal lines. Below the password field is a "Log in" button. The background features a stylized blue illustration of a person's head profile with a pen writing on it.

We sign in with “cb” account.

Group 80:
Do Viet Hoang – n10329935
Quoc Huy Nguyen – n10289020

The screenshot shows the BBCreator application's home page. At the top right, it displays "Username: cb ID: 3" and a close button (X). The main header reads "Welcome to BBCreator ! Start building your own billboard and share it with your friends." Below this, a sub-header says "THE #1 BILLBOARD GENERATOR". A central call-to-action text reads "Create stunning billboards and earn the bragging rights with your friends." To the left is a sidebar menu with options: Home, Create Billboards (which is selected), List Billboards, Schedule Billboards, and Edit Users. At the bottom left is a "Log Out" link. On the right side, there are three promotional images: a person using a laptop with a billboard design, a woman wearing a t-shirt with a billboard design, and a desk setup with a computer monitor and a smartphone.

Now, go to the Create Billboards Page and create a billboard.

The screenshot shows the BBCreator "Create Billboards" page. At the top right, it displays "Username: cb ID: 3" and a close button (X). The main header reads "Create Billboards Building the stunning billboards just by few steps." Below this, a sub-header says "THE #1 BILLBOARD GENERATOR". A central call-to-action text reads "Get the perfect billboard design! Whatever your need we'll help get it". To the left is a sidebar menu with options: Home, Create Billboards (selected), List Billboards, Schedule Billboards, and Edit Users. At the bottom left is a "Log Out" link. On the right side, there is a large form titled "Tell us about your billboard" with fields for "Name your billboard" (containing "billboard by cb"), "Describe your billboard" (containing "Hi, I am cb"), "Add inspiration image (Choose your image or add URL)" (with a placeholder "Choose image"), "Choose background color" (set to "#FFFFFF"), "Choose message color" (set to "#000000"), "Choose information color" (set to "#000000"), and buttons for "Submit", "Preview", "Import", and "Export". A small "Add successfully" message box is visible in the center of the page.

Going to List Billboards Page, since “cb” account does not have “Edit Billboards” permission, it can only delete and edit the billboard it created.

Group 80:
Do Viet Hoang – n10329935
Quoc Huy Nguyen – n10289020

We ❤ BBCreator

Username: cb ID: 3 X

BBCreator

Home Create Billboards List Billboards Schedule Billboards Edit Users Log Out

List Billboards

Display all your billboards

Billboards List

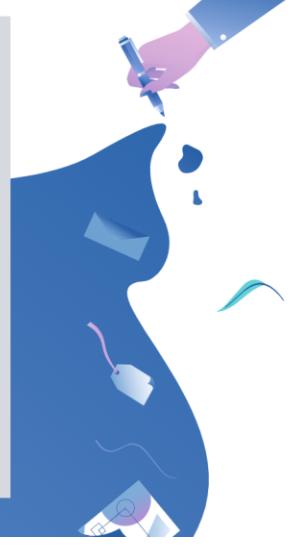
| Billboard ID | User ID | Message | Information | Background... | Message color | Information c... | Created at | Update at | Picture |
|--------------|---------|------------------|-----------------|---------------|---------------|------------------|-----------------|-----------------|------------------|
| 6 | 1 | All custom co... | All custom c... | #0000C0 | #FF9E3F | #3FFFC7 | Thu May 21 1... | Thu May 21 1... | null |
| 7 | 1 | The informa... | The informa... | #005555 | #FFFFF | #0000D0 | Thu May 21 1... | Thu May 21 1... | null |
| 8 | 1 | null | null | #FFCA57 | #000000 | #000000 | Thu May 21 1... | Thu May 21 1... | https://cloud... |
| 9 | 3 | billboard by cb | Hi, I am cb | #FFFFFF | #000000 | #000000 | Thu May 21 1... | Thu May 21 1... | null |

Message

Can only delete your own billboard

OK

Edit Preview Delete



We ❤ BBCreator

Username: cb ID: 3 X

BBCreator

Home Create Billboards List Billboards Schedule Billboards Edit Users Log Out

List Billboards

Display all your billboards

Billboards List

| Billboard ID | User ID | Message | Information | Background... | Message color | Information c... | Created at | Update at | Picture |
|--------------|---------|------------------|-----------------|---------------|---------------|------------------|-----------------|-----------------|------------------|
| 6 | 1 | All custom co... | All custom c... | #0000C0 | #FF9E3F | #3FFFC7 | Thu May 21 1... | Thu May 21 1... | null |
| 7 | 1 | The informa... | The informa... | #005555 | #FFFFF | #0000D0 | Thu May 21 1... | Thu May 21 1... | null |
| 8 | 1 | null | null | #FFCA57 | #000000 | #000000 | Thu May 21 1... | Thu May 21 1... | https://cloud... |
| 9 | 3 | billboard by cb | Hi, I am cb | #FFFFFF | #000000 | #000000 | Thu May 21 1... | Thu May 21 1... | null |

Message

Edit successfully

OK

Edit Preview Delete

Start edit your billboard

Billboard ID: 9

Name your billboard: billboard by cb

Describe your billboard: Hi, I am cb!!

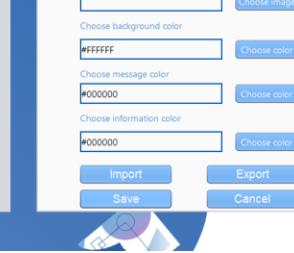
Add inspiration image (Choose your image or add URL): Choose image

Choose background color: #FFFFFF

Choose message color: #000000

Choose information color: #000000

Import Export



Group 80:
Do Viet Hoang – n10329935
Quoc Huy Nguyen – n10289020

We ❤ BBCreator

Username: cb ID: 3 X

BBCreator

Home Create Billboards List Billboards Schedule Billboards Edit Users Log Out

List Billboards Display all your billboards

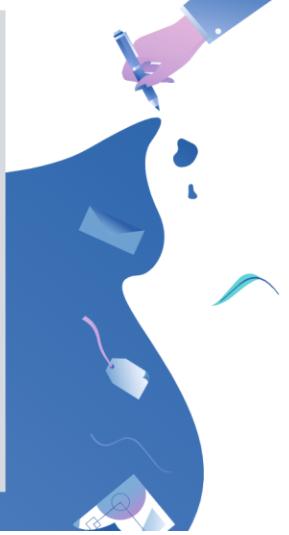
Billboards List

| Billboard ID | User ID | Message | Information | Background... | Message color | Information c... | Created at | Updated at | Picture |
|--------------|---------|------------------|-----------------|---------------|---------------|------------------|-----------------|-----------------|------------------|
| 6 | 1 | All custom co... | All custom c... | #6800C0 | #FFF9E3F | #3FFFC7 | Thu May 21 1... | Thu May 21 1... | null |
| 7 | 1 | The informa... | The informa... | #555555 | #FFFFFF | #000000 | Thu May 21 1... | Thu May 21 1... | null |
| 8 | 1 | null | null | #FFC457 | #000000 | #000000 | Thu May 21 1... | Thu May 21 1... | https://cloud... |
| 9 | 3 | billboard by cb | Hii I am cb! | #FF7FFF | #000000 | #000000 | Thu May 21 1... | Thu May 21 1... | null |

Message X

Delete successfully! OK

Edit Preview Delete



We cannot access Schedule Billboards Page since “cb” account does not have “Schedule Billboards” permission.

We ❤ BBCreator

Username: cb ID: 3 X

BBCreator

Home Create Billboards List Billboards Schedule Billboards Edit Users Log Out

List Billboards Display all your billboards

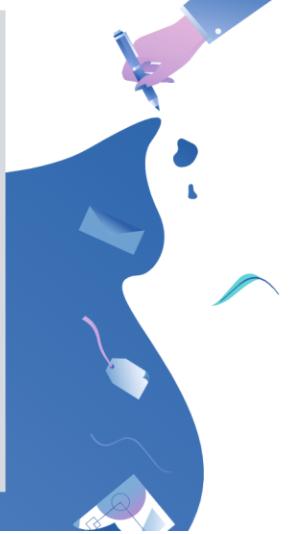
Billboards List

| Billboard ID | User ID | Message | Information | Background... | Message color | Information c... | Created at | Updated at | Picture |
|--------------|---------|------------------|-----------------|---------------|---------------|------------------|-----------------|-----------------|------------------|
| 6 | 1 | All custom co... | All custom c... | #6800C0 | #FFF9E3F | #3FFFC7 | Thu May 21 1... | Thu May 21 1... | null |
| 7 | 1 | The informa... | The informa... | #555555 | #FFFFFF | #000000 | Thu May 21 1... | Thu May 21 1... | null |
| 8 | 1 | null | null | #FFC457 | #000000 | #000000 | Thu May 21 1... | Thu May 21 1... | https://cloud... |

Message X

Do not have permission OK

Edit Preview Delete



Group 80:

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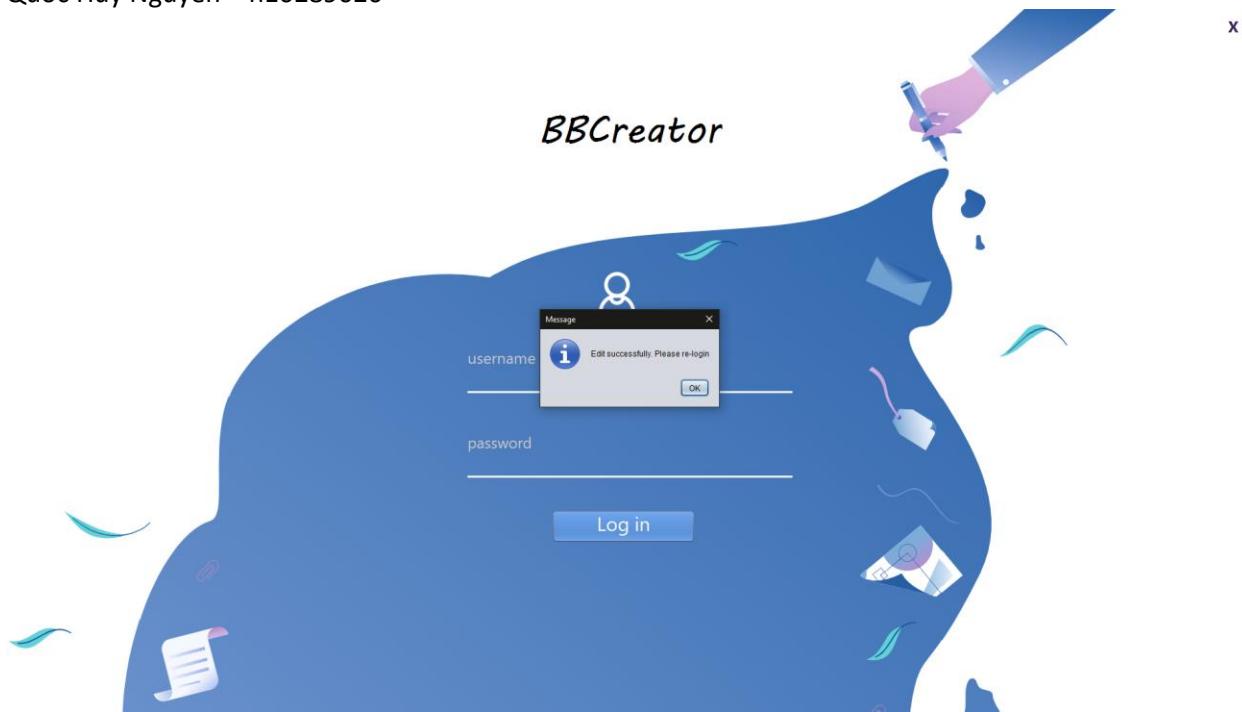
Going to Edit Users Page, we can only see the information about the account we are using since “cb” account does not have “Edit Users” permission.

The screenshot shows the BBCreator application interface. On the left is a sidebar with options: Home, Create Billboards (selected), List Billboards, Schedule Billboards, and Edit Users. The main area has a purple header 'Edit Users' and a sub-header 'Modify users' information as you wish'. Below is a 'User List' table with one row (User ID: 11, Username: cb). A modal window titled 'Message' is centered over the table, displaying the text 'Do not have permission' with an 'OK' button. At the bottom of the main area are 'Edit', 'Add', and 'Delete' buttons. The top right corner shows 'Username: cb ID: 11'. The background features a blue silhouette of a person holding a pen and a paintbrush.

Using “cb” account, we can only edit the password. Now, we change the password to “1234” and click Save. If you edit your own account, it automatically logout.

This screenshot shows the BBCreator application again. The sidebar and main interface are identical to the previous one. However, an 'Edit user' dialog is overlaid on the 'Edit Users' page. This dialog contains fields for 'User ID' (11), 'Username' (cb), 'Password' (****), 'Re-enter password' (****), and a 'Permission' section with checkboxes for 'Create Billboards' (checked), 'Edit All Billboards', 'Schedule Billboards', and 'Edit Users'. At the bottom of the dialog are 'Save' and 'Cancel' buttons. The background features a blue silhouette of a person holding a pen and a paintbrush.

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Now, sign in by using account with username “eb” and password “eb”. Since this account does not have permission “Create Billboards” and “Schedule Billboards”, it cannot access to Create Billboards Page and Schedule Billboards Page.

A screenshot of the BBCreator application interface. The left sidebar shows navigation options: Home, Create Billboards (which is checked), List Billboards, Schedule Billboards, and Edit Users. The main content area has a purple header with the text "Welcome to BBCreator ! Start building your own billboard and share it with your friends." Below this, there is a promotional message: "THE #1 BILLBOARD GENERATOR Create stunning and earn the bra with your friends." A "See all billboards" button is visible. A message box in the center says "Do not have permission" with an "OK" button. To the right, there are three images: a person working on a laptop with a "YOUR DESIGN HERE" t-shirt displayed on the screen, a person's hands working on a laptop, and a person wearing a "YOUR DESIGN HERE" t-shirt standing next to a car. The top right corner of the interface shows "Username: eb ID: 2".

Group 80:

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Going to List Billboards Page, “eb” account with “Edit Billboards” permission can edit or delete any billboards.

The screenshot shows the BBCreator application interface. On the left is a sidebar with navigation links: Home, Create Billboards, List Billboards (which is selected), Schedule Billboards, Edit Users, and Log Out. The main content area has a purple header "We ❤ BBCreator" and a sub-header "List Billboards" with the sub-instruction "Display all your billboards". Below this is a "Billboards List" table with two rows of data. At the bottom of the list is a "Message" dialog box with the text "Delete successfully!" and an "OK" button. Below the table are three buttons: Edit, Preview, and Delete. The top right corner shows the user information "Username: eb ID: 2" and a close button "X". To the right of the main content is a blue abstract graphic featuring a hand holding a pen and a small notepad.

| Billboard ID | User ID | Message | Information | Background | Message color | Information c... | Created at | Update at | Picture |
|--------------|---------|------------------|-----------------|------------|---------------|------------------|---------------|---------------|---------|
| 6 | 1 | All custom co... | All custom c... | #8800C0 | #FF93CF | #3FFC7... | Thu May 21... | Thu May 21... | null |
| 7 | 1 | The informa... | The informa... | #555555 | #FFFFF... | #DODDD... | Thu May 21... | Thu May 21... | null |

Same as “cb” account, the permission of “eb” account in Edit Users Page is also limited.

The screenshot shows the BBCreator application interface. The sidebar is identical to the previous one. The main content area has a purple header "We ❤ BBCreator" and a sub-header "Edit Users" with the sub-instruction "Modify users' information as you wish". Below this is a "User List" table with one row of data. At the bottom of the list is a "Message" dialog box with the text "Do not have permission" and an "OK" button. Below the table are three buttons: Edit, Add, and Delete. The top right corner shows the user information "Username: eb ID: 2" and a close button "X". To the right of the main content is a blue abstract graphic featuring a hand holding a pen and a small notepad.

| UserID | Username | Permission | Created at | Update at |
|--------|----------|------------|------------------|--------------------------------|
| 2 | eb | | 11:12 AEST 20... | Thu May 21 16:21:12 AEST 20... |

Group 80:
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Now, we log out and sign in with “sb” account.

The screenshot shows the BBCreator website homepage. The header includes the BBCreator logo, a purple navigation bar with links for Home, Create Billboards (which is checked), List Billboards, Schedule Billboards, and Edit Users, and a Log Out button. The main content area has a purple header bar with the text "Welcome to BBCreator ! Start building your own billboard and share it with your friends." Below this, there's a section titled "THE #1 BILLBOARD GENERATOR" with the text "Create stunning billboards and earn the bragging rights with your friends." A blue button labeled "See all billboards" is visible. To the right, there are three images: a person working on a laptop with a billboard design, a woman wearing a t-shirt with a billboard design, and a desk setup with a mug and a phone both showing a billboard design. The top right corner of the page shows the text "Username: sb ID: 4" and a close button.

Since this account does not have permission “Create Billboards”, it cannot access to Create Billboards Page.

This screenshot is identical to the one above, showing the BBCreator homepage for user 'sb'. However, a modal dialog box has appeared in the center of the screen. The dialog box has an information icon and the text "Do not have permission". It contains two buttons: "OK" and "Cancel". This indicates that the user lacks the necessary permissions to access the "Create Billboards" feature.

Group 80:
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Go to the Schedule Billboards Page to schedule a billboard:

The screenshot shows the BBCreator application interface. On the left, a sidebar menu includes 'Home', 'Create Billboards', 'List Billboards', 'Schedule Billboards', and 'Edit Users'. The main area is titled 'Edit Schedule' with the sub-instruction 'Schedule billboards to be displayed on the Viewers'. Below this is a 'Schedule List' table with columns for dates from May 21 to 27, time ranges, and schedule IDs. A modal window titled 'Schedule your billboard' is open at the bottom, containing fields for 'Schedule ID', 'Billboard ID', 'Billboard message', 'Start time (hhmm dd-mm-yyyy)', 'Time limit (minutes)', and 'Next run [minute]'. Buttons for 'Save', 'Delete', and 'Cancel' are at the bottom of the modal.

Next, we log out and sign in “admin” account with password “1234”. Go to Edit Users Page and create 2 more users:

| Username | password | permission |
|----------|----------|--|
| cbsb | cbsb | “Create Billboards”, “Schedule Billboards” |
| ebsb | ebsb | “Edit Billboards”, “Schedule Billboards” |

The screenshot shows the BBCreator 'Edit Users' page. The sidebar menu is identical to the previous screenshot. The main area is titled 'Edit Users' with the sub-instruction 'Modify users' information as you wish'. Below this is a 'User List' table with columns for User ID, Username, Permission, Created at, and Updated at. The table lists 15 users, including 'admin' and several newly created accounts like 'cbsb' and 'ebsb'. A modal window titled 'User List' is open at the bottom, containing fields for 'User ID', 'Username' (with dropdown options for 'cbsb' and 'ebsb'), 'Permission' (with dropdown options for '[CB, EB, SB, EU]' and '[EB]'), and 'Created at' and 'Updated at' (both showing 'Tue May 19 10:00:21.111 AEST 20...'). Buttons for 'Edit', 'Add', and 'Delete' are at the bottom of the modal.

Group 80:
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Log out and log in to “cbsb” account.

The screenshot shows the BBCreator application interface. On the left is a dark sidebar with the title 'BBCreator' at the top. Below it are several menu items: 'Home' (selected), 'Create Billboards' (highlighted in blue), 'List Billboards', 'Schedule Billboards', and 'Edit Users'. At the bottom of the sidebar is a 'Log Out' button. The main content area has a purple header bar with the text 'Welcome to BBCreator !' and 'Start building your own billboard and share it with your friends.' Below this, there's a section titled 'THE #1 BILLBOARD GENERATOR' with the subtext 'Create stunning billboards and earn the bragging rights with your friends.' A blue button labeled 'See all billboards' is located below this text. To the right of the text are three images: a person working on a laptop with a billboard design on the screen, a white mug with 'YOUR DESIGN HERE' printed on it, and a person wearing a t-shirt with the same text. The overall background of the main content area is light blue.

Now, we go to Create Billboards Page to create a new billboard.

The screenshot shows the 'Create Billboards' page of the BBCreator application. The left sidebar remains the same as the previous page. The main content area has a purple header bar with the text 'Create Billboards' and 'Building the stunning billboards just by few steps.' Below this, there's a section titled 'THE #1 BILLBOARD GENERATOR' with the subtext 'Get the perfect billboard design! Whatever your need we'll help get it.' A message box is overlaid on the page, showing a blue info icon and the text 'Add successfully!' with an 'OK' button. To the right of the message box is a large area for creating a billboard. It features a preview window showing a tall, vertical image with a yellow gradient and the text 'Tall testing image'. To the right of the preview is a form titled 'Tell us about your billboard' with fields for 'Name your billboard' (a text input field), 'Describe your billboard' (a text area), 'Add inspiration image (Choose your image or add URL)' (a file input field with a URL placeholder), 'Choose background color' (a color picker with hex code #FFC457), 'Choose message color' (a color picker with hex code #000000), 'Choose information color' (a color picker with hex code #000000), and buttons for 'Submit', 'Preview', 'Import', and 'Export'. The overall background of the main content area is light blue.

Group 80:

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Then, we go to Schedule Billboards Page to schedule the billboard we just created. After that, proceed to List Billboards page. Try to edit or delete the billboard we just created. It is impossible since that billboard is presently scheduled.

The screenshot shows the BBCreator application interface. On the left is a sidebar with navigation links: Home, Create Billboards (selected), List Billboards, Schedule Billboards, and Edit Users. On the right, the main area displays a "List Billboards" page with the heading "Display all your billboards". Below the heading is a table titled "Billboards List" with two rows of data. A modal window titled "Message" is overlaid on the page, displaying the text "Cannot edit billboard presently scheduled" with an "OK" button. At the bottom of the main area are three buttons: "Edit", "Preview", and "Delete". The top right corner of the main area shows the text "Username: cbsb ID: 5". The background features a blue silhouette of a person's head and shoulders, with a hand holding a pen writing on it.

We also cannot edit or delete other billboards since “cbsb” account does not have “Edit Billboards” permission.

The screenshot shows the BBCreator application interface. The sidebar and main area are identical to the previous screenshot, but the "List Billboards" page shows a different set of data in the "Billboards List" table. A modal window titled "Message" is overlaid, displaying the text "Can only edit your own billboard" with an "OK" button. The bottom buttons "Edit", "Preview", and "Delete" are visible. The top right corner shows the text "Username: cbsb ID: 5". The background features a blue silhouette of a person's head and shoulders, with a hand holding a pen writing on it.

Group 80:

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Log out and sign in with “ebsb” account. With “Edit Billboards” permission, now we can delete the billboard created by “cbsb” even it is currently scheduled.

The screenshot shows the BBCreator application interface. On the left is a sidebar with options: Home, Create Billboards (selected), List Billboards, Schedule Billboards, Edit Users, and Log Out. The main area is titled "List Billboards" with the sub-instruction "Display all your billboards". Below this is a table titled "Billboards List" with the following data:

| Billboard ID | User ID | Message | Information | Background | Message color | Information c... | Created at | Update at | Picture |
|--------------|---------|------------------|-----------------|------------|---------------|------------------|-----------------|-----------------|------------------|
| 6 | 1 | All custom co... | All custom c... | #E800C0 | #FF93E3F | #3FFFC7 | Thu May 21 1... | Thu May 21 1... | null |
| 10 | 5 | null | null | #FFCA57 | #E900000 | #050000 | Thu May 21 1... | Thu May 21 1... | https://cloud... |

A modal window titled "Message" displays the message "Delete successfully!" with an "OK" button. At the bottom of the main area are three buttons: "Edit", "Preview", and "Delete". To the right of the main content is a decorative graphic of a person holding a paintbrush over a blue silhouette of a person's head.

The Billboard Viewer will update every 15 seconds.

