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# Testing Document

Testing will be done on a Mac and a Windows machines to ensure cross-platform compatibility

## Login Test Cases

White Box Test	
Test case	<b>Test 1:</b> Input no username and no password in login screen
Input/Steps	<ol style="list-style-type: none"><li>1. Navigate to login page</li><li>2. Without entering anything in the username and password fields, pressed the login button</li></ol>
Expected Output	Return an error message on the same page saying all fields must be filled

White Box Test	
Test case	<b>Test 2:</b> Input only username and no password to login screen
Input/Steps	<ol style="list-style-type: none"><li>1. Navigate to login page</li><li>2. Enter either a valid or invalid username</li><li>3. Skip the password field</li><li>4. Press login button</li></ol>
Expected Output	Return an error message on the same page saying all fields must be filled

White Box Test	
Test case	<b>Test 3:</b> Input only password and no username to login screen
Input/Steps	<ol style="list-style-type: none"> <li>1. Navigate to login page</li> <li>2. Enter a password but skip the username field</li> <li>3. Press login button</li> </ol>
Expected Output	Return an error message on the same page saying all fields must be filled

White Box Test	
Test case	<b>Test 4:</b> Input a username that doesn't exist in database
Input/Steps	<ol style="list-style-type: none"> <li>1. Navigate to login page</li> <li>2. Enter an invalid username that doesn't exist in database</li> <li>3. Enter something into password field</li> <li>4. Press login button</li> </ol>
Expected Output	Return an error message saying invalid username/password

White Box Test	
Test case	<b>Test 5:</b> Input a username with incorrect password
Input/Steps	<ol style="list-style-type: none"> <li>1. Navigate to login page</li> <li>2. Enter a valid username but the wrong password</li> <li>3. Press login button</li> </ol>
Expected Output	Return an error message saying invalid username/password

White Box Test	
Test case	<b>Test 6:</b> Input both valid username and valid password
Input/Steps	<ol style="list-style-type: none"> <li>1. Navigate to login page</li> <li>2. Input a valid username and the password associated with it</li> <li>3. Press login button</li> </ol>
Expected Output	Redirect the user to the homepage, logged in as that user

Black Box Test	
Test case	<b>Test 7:</b> Check home button functionality
Input/Steps	<ol style="list-style-type: none"> <li>1. Navigate to login page</li> <li>2. Press home button</li> </ol>
Expected Output	Redirect the user to the homepage, without being logged in

Black Box Test	
Test case	<b>Test 8:</b> Check login button functionality
Input/Steps	<ol style="list-style-type: none"> <li>1. Navigate to login page</li> <li>2. Press login button</li> </ol>
Expected Output	Redirect the user to the login page again

Black Box Test	
Test case	<b>Test 9:</b> Check view all lectures button functionality
Input/Steps	<ol style="list-style-type: none"> <li>1. Navigate to home page</li> <li>2. Press view all lectures button</li> </ol>
Expected Output	Redirect the user to lectures page with lectures

Unit Test	
Test case	<b>Test 10:</b> Test SQL code in the username text space
Input/Steps	<ol style="list-style-type: none"> <li>1. Navigate to login page</li> <li>2. Enter SQL injection code into username space</li> </ol>
Expected Output	An error message is generated

Unit Test	
Test case	<b>Test 11:</b> Test SQL code in the password text space
Input/Steps	<ol style="list-style-type: none"> <li>1. Navigate to login page</li> <li>2. Enter SQL injection code into password space</li> </ol>
Expected Output	An error message is generated

## Lecture Page Test Cases

Black Box Test	
Test case	<b>Test 12:</b> Check to see if “Your Courses” is removed when not logged in
Input/Steps	<ol style="list-style-type: none"> <li>1. Navigate to lecture page when not logged in</li> </ol>
Expected Output	The “Your Courses” section should not be visible

Black Box Test	
Test case	<b>Test 13:</b> Check to see if “Your Courses” is visible when logged in
Input/Steps	<ol style="list-style-type: none"> <li>1. Navigate to lecture page without logging in, check that “Your Courses” is not visible</li> <li>2. Log in through the login page</li> <li>3. Navigate to lecture page again</li> </ol>
Expected Output	The “Your courses” section should be visible

Black Box Test	
Test case	<b>Test 14:</b> Check home button functionality on this page
Input/Steps	<ol style="list-style-type: none"> <li>1. Navigate to lecture page</li> <li>2. Click the home button</li> </ol>
Expected Output	The user should be redirected back to the homepage

Black Box Test	
Test case	<b>Test 15:</b> Check login button functionality on this page
Input/Steps	<ol style="list-style-type: none"> <li>1. Navigate to lectures page</li> <li>2. Click on the login button</li> </ol>
Expected Output	The user should be redirected to the login page

Black Box Test	
Test case	<b>Test 16:</b> Test links to public courses when you're logged in
Input/Steps	<ol style="list-style-type: none"> <li>1. Navigate to lectures page when logged in</li> <li>2. Click on a course under the "Public Course" section</li> </ol>
Expected Output	The user should be sent to that course's streaming page

Black Box Test	
Test case	<b>Test 17:</b> Test links to user's courses when logged in
Input/Steps	<ol style="list-style-type: none"> <li>1. Navigate to lectures page when logged in</li> <li>2. Click on course under "Your Courses" section</li> </ol>
Expected Output	The user should be sent to that course's streaming page

Black Box Test	
Test case	<b>Test 18:</b> Test links to public courses when user isn't logged in
Input/Steps	<ol style="list-style-type: none"> <li>1. Navigate to lectures page when not logged in</li> <li>2. Click on a course under "Public Course" section</li> </ol>
Expected Output	The user should be sent to that course's streaming page

## Streaming Page Test Cases

Black Box Test	
Test case	<b>Test 19:</b> Check files are added correctly
Input/Steps	<ol style="list-style-type: none"><li>1. Navigate to Stream page</li><li>2. Add a file</li></ol>
Expected Output	File should appear in the file section

Black Box Test	
Test case	<b>Test 20:</b> Check files are accessible
Input/Steps	<ol style="list-style-type: none"><li>1. Navigate to Stream page</li><li>2. Click on an arbitrary file</li></ol>
Expected Output	File should be able to be opened by all users

Black Box Test	
Test case	<b>Test 21:</b> Check if files are accessible when rejoin after closing the screen
Input/Steps	<ol style="list-style-type: none"><li>1. Exit out of application</li><li>2. Navigate to Stream page and click arbitrary file</li></ol>
Expected Output	File should still be able to be accessed

Regression Test	
Test case	<b>Test 22:</b> Check if comments update correctly
Input/Steps	<ol style="list-style-type: none"> <li>1. Navigate to Stream page</li> <li>2. Type in a comment and send</li> </ol>
Expected Output	Message should show up in all current users' chat windows

Black Box Test	
Test case	<b>Test 23:</b> Check if comments are visible after rejoining
Input/Steps	<ol style="list-style-type: none"> <li>1. Leave the stream page</li> <li>2. Rejoin stream page</li> </ol>
Expected Output	Previous messages should still all be visible

Regression Test	
Test case	<b>Test 24:</b> Check if textarea updates the chat
Input/Steps	<ol style="list-style-type: none"> <li>1. Go to a streaming page as a student or course staff</li> <li>2. Type something in chat box and press send</li> <li>3. See if chat box updated on other viewer's computer</li> </ol>
Expected Output	Chat updated on all users' computer

Regression Test	
Test case	<b>Test 25:</b> Check if textarea shows after quitting and rejoining screen
Input/Steps	<ol style="list-style-type: none"> <li>1. Click logout</li> <li>2. Clear web browser cache</li> <li>3. Go to stream page</li> <li>4. Type something in textarea and press sent (if textarea shows)</li> <li>5. See if chat box updated on other viewers' computer</li> </ol>
Expected Output	Textarea shows and functional

## Access Level Test Cases

Black Box Test	
Test case	<b>Test 26:</b> streaming page layout (no live stream started) as course staff
Input/Steps	<ol style="list-style-type: none"><li>1. Login as course staff</li><li>2. Go to a course</li></ol>
Expected Output	The following are visible <ul style="list-style-type: none"><li>● Start live stream button</li><li>● Add file button</li><li>● Enable chat button</li></ul>

Black Box Test	
Test case	<b>Test 27:</b> streaming page layout (no live stream started) as student/guest
Input/Steps	<ol style="list-style-type: none"><li>1. Login as student or not log in at all</li><li>2. Go to a course</li></ol>
Expected Output	The following are disabled <ul style="list-style-type: none"><li>● Video box</li><li>● File box</li><li>● Chat box</li></ul> A warning message is displayed in video box indicating live stream is not started



Black Box Test	
Test case	<b>Test 28:</b> streaming page layout (live stream started) as course staff
Input/Steps	<ol style="list-style-type: none"> <li>1. Login as course staff</li> <li>2. Go to a live stream</li> </ol>
Expected Output	<p>The following are visible</p> <ul style="list-style-type: none"> <li>• End live stream button</li> <li>• Add file button</li> <li>• Disable chat button</li> <li>• When right click on a chat message <ul style="list-style-type: none"> <li>○ Delete</li> <li>○ Reply</li> </ul> </li> </ul> <p>The following are enabled</p> <ul style="list-style-type: none"> <li>• Chat box</li> <li>• Video box</li> <li>• File box</li> </ul>

Black Box Test	
Test case	<b>Test 29:</b> streaming page layout (live stream started) as student
Input/Steps	<ol style="list-style-type: none"> <li>1. Login as student</li> <li>2. Go to a live stream</li> </ol>
Expected Output	<p>The following are visible</p> <ul style="list-style-type: none"> <li>• When right click on a chat message <ul style="list-style-type: none"> <li>○ Reply</li> </ul> </li> </ul> <p>The following are enabled</p> <ul style="list-style-type: none"> <li>• Chat box</li> <li>• File box</li> <li>• Video box</li> </ul>

Black Box Test	
Test case	<b>Test 30:</b> streaming page layout (live stream started) as guest
Input/Steps	1. Go to a live stream without logging in
Expected Output	<p>The following are disabled</p> <ul style="list-style-type: none"> <li>• Chat box</li> </ul> <p>The following are enabled</p> <ul style="list-style-type: none"> <li>• File box</li> <li>• Video box</li> </ul>

White Box Test	
Test case	<b>Test 31:</b> Test starting stream as course staff
Input/Steps	2. Login as course staff 3. Go to a course 4. Click start live stream 5. Check student's' mailbox 6. Login as student 7. Go to the live stream
Expected Output	The stream is shown on all clients connected. Email sent to enrolled students

White Box Test	
Test case	<b>Test 32:</b> Test starting stream as student/guest
Input/Steps	1. Login as student or not log in at all 2. Go to an available live stream 3. Open browser console 4. Call start live stream javascript function directly in console
Expected Output	Display error in console. No live stream started

Black Box Test	
Test case	<b>Test 33:</b> Test ending stream as course staff
Input/Steps	<ol style="list-style-type: none"> <li>1. Login as course staff</li> <li>2. Go to a course</li> <li>3. Click start live stream</li> <li>4. Open a different browser <ol style="list-style-type: none"> <li>a. login as student or not log in at all</li> <li>b. Go to live stream page</li> </ol> </li> <li>5. Click end live stream</li> </ol>
Expected Output	Stream ended shown on all clients' view

Regression Test	
Test case	<b>Test 34:</b> Test ending stream as course staff
Input/Steps	<ol style="list-style-type: none"> <li>1. Login as student or not log in at all</li> <li>2. Go to a live stream available</li> <li>3. Open browser console</li> <li>4. Call end live stream function from console</li> </ol>
Expected Output	Display an error. Livestream not affected

Black Box Test	
Test case	<b>Test 35:</b> Invite students as course staff
Input/Steps	<ol style="list-style-type: none"> <li>1. Login as course staff</li> <li>2. Go to a course</li> <li>3. Click invite user</li> <li>4. Check invited user's mailbox</li> </ol>
Expected Output	A link sent to target email address

Regression Test	
Test case	<b>Test 36:</b> Invite students as student/guest
Input/Steps	<ol style="list-style-type: none"> <li>1. Login as student or not log in at all</li> <li>2. Go to an available course</li> <li>3. Open console</li> <li>4. Call invite user function from console</li> </ol>
Expected Output	Display an error. No email sent

Black Box Test	
Test case	<b>Test 37:</b> Invite users who are already invited
Input/Steps	<ol style="list-style-type: none"> <li>1. Login as course staff</li> <li>2. Go to a course</li> <li>3. Click invite student</li> <li>4. Open console</li> <li>5. Invite an invited student by calling invite student function from console</li> </ol>
Expected Output	All invited students are not visible when “invite student” is clicked Return an error saying the user is already enrolled

Regression Test	
Test case	<b>Test 38:</b> Test delete chat question as course staff
Input/Steps	<ol style="list-style-type: none"> <li>1. Login as course staff</li> <li>2. Go to a live stream</li> <li>3. Select a chat message</li> <li>4. Click delete</li> <li>5. Log in using another account on a different browser</li> <li>6. Go to the live stream</li> </ol>
Expected Output	The chat message is deleted and other chat messages are not affected

White Box Test	
Test case	<b>Test 39:</b> Test delete chat question as student/guest
Input/Steps	<ol style="list-style-type: none"> <li>1. Login as student or not log in at all</li> <li>2. Go to a live stream</li> <li>3. Select a chat message</li> <li>4. Open console</li> <li>5. Call delete message function to delete the selected message from console</li> </ol>
Expected Output	Delete button should be disabled Display an error message in console

Black Box Test	
Test case	<b>Test 40:</b> reply student chat message as course staff
Input/Steps	<ol style="list-style-type: none"> <li>1. Login as course staff</li> <li>2. Go to a live stream</li> <li>3. Right-click a message and click reply</li> <li>4. Type something in chat box text area</li> <li>5. Open a different browser</li> <li>6. Login a different account</li> <li>7. Go to the live stream page</li> </ol>
Expected Output	Course staff message should have different color The message should have @<user name> at the beginning

Black Box Test	
Test case	<b>Test 41:</b> reply student chat message as student
Input/Steps	<ol style="list-style-type: none"> <li>1. Login as student</li> <li>2. Go to a live stream</li> <li>3. Right-click a message and click reply</li> <li>4. Type something in chat box textarea</li> <li>5. Open a different browser</li> <li>6. Login a different account</li> <li>7. Go to the live stream page</li> </ol>
Expected Output	Student message should have default color The message should have @<user name> at the beginning

Regression Test	
Test case	<b>Test 42:</b> reply student chat message as guest
Input/Steps	<ol style="list-style-type: none"> <li>1. Go to a live stream without logging in</li> <li>2. Open console</li> <li>3. Call reply message function with an existing message from console</li> <li>4. Open a different browser</li> <li>5. Go to the live stream page</li> </ol>
Expected Output	Display an error in console No message sent

White Box Test	
Test case	<b>Test 43:</b> Start more than one live stream at same time for a single user
Input/Steps	<ol style="list-style-type: none"> <li>1. Login as course staff</li> <li>2. Go to a course</li> <li>3. Click start live stream</li> <li>4. Open a new tab</li> <li>5. Go to a course</li> <li>6. Open console</li> <li>7. Call start live stream function</li> </ol>
Expected Output	Disable start live stream button once the user has started a live stream Display an error in console

Black Box Test	
Test case	<b>Test 44:</b> Test deleting file as course staff
Input/Steps	<ol style="list-style-type: none"> <li>1. Login as course staff</li> <li>2. Go to a live stream</li> <li>3. Right-click a file in file box</li> <li>4. Click delete to delete the file</li> <li>5. Refresh the page</li> <li>6. Open a different browser</li> <li>7. Login a different account</li> <li>8. Go to the live stream</li> </ol>
Expected Output	File should be deleted

White Box Test	
Test case	<b>Test 45:</b> Test deleting file as student/guest
Input/Steps	<ol style="list-style-type: none"> <li>1. Login as student or not log in at all</li> <li>2. Go to a live stream</li> <li>3. Open console</li> <li>4. Call delete file function from console</li> </ol>
Expected Output	Display an error in console

White Box Test	
Test case	<b>Test 46:</b> Test starting stream for a course when a live stream is already started for that course
Input/Steps	<ol style="list-style-type: none"> <li>1. Login as course staff</li> <li>2. Go to a live stream</li> <li>3. Open browser console</li> <li>4. Call start live stream javascript function directly in console</li> </ol>
Expected Output	Start live stream button should not be visible. Display an error in console. No additional live stream started

## Camera Test Cases

Black Box Test	
Test case	<b>Test 47:</b> Camera unavailable but microphone available
Input/Steps	<ol style="list-style-type: none"> <li>1. Disable camera on a computer or use a computer that doesn't have camera</li> <li>2. Login as course staff</li> <li>3. Click start live stream</li> <li>4. Open a different browser</li> <li>5. Login a different account</li> <li>6. Go to the live stream</li> </ol>
Expected Output	Live stream with sound only Display warning on video box indicating no visual content available

Black Box Test	
Test case	<b>Test 48:</b> Camera available but microphone unavailable
Input/Steps	<ol style="list-style-type: none"> <li>1. Disable microphone on a computer or use a computer that doesn't have microphone</li> <li>2. Login as course staff</li> <li>3. Click start live stream</li> <li>4. Open a different browser</li> <li>5. Login a different account</li> <li>6. Go to the live stream</li> </ol>
Expected Output	Live stream with silenced video Audio control button (volume and mute button) is disabled

Black Box Test	
Test case	<b>Test 49:</b> Both camera and microphone unavailable
Input/Steps	<ol style="list-style-type: none"> <li>1. Disable camera and microphone on a computer or use a computer that doesn't have camera and microphone</li> <li>2. Login as course staff</li> <li>3. Click start live stream</li> <li>4. Open a different browser</li> <li>5. Login a different account</li> <li>6. Go to the live stream</li> </ol>
Expected Output	Video box is disabled

## Networking Test Cases

Regression Test	
Test case	<b>Test 50:</b> course staff disconnected during live stream
Input/Steps	<ol style="list-style-type: none"> <li>1. Login as course staff</li> <li>2. Click start live stream</li> <li>3. Disable internet connection</li> <li>4. Use a different computer</li> <li>5. Go to the live stream</li> </ol>
Expected Output	Display warning on video box indicating instructor is offline Other functionalities not affected



Black Box Test	
Test case	<b>Test 51:</b> course staff disconnected during live stream and rejoin the live stream
Input/Steps	<ol style="list-style-type: none"> <li>1. Login as course staff</li> <li>2. Click start live stream</li> <li>3. Disable internet connection</li> <li>4. Use a different computer <ol style="list-style-type: none"> <li>a. Login with a different account</li> <li>b. Go to the live stream</li> </ol> </li> <li>5. Reconnect to the internet</li> <li>6. Go back to live stream</li> </ol>
Expected Output	<p>While offline, video box shows “course staff offline”</p> <p>Video box keep displaying live-streamed video once connection is re-established</p>

Black Box Test	
Test case	<b>Test 52:</b> Livestream distribution for multiple viewers
Input/Steps	<ol style="list-style-type: none"> <li>1. Login as course staff</li> <li>2. Click start live stream</li> <li>3. Open a different browser</li> <li>4. Login a different account <ol style="list-style-type: none"> <li>a. Go to the live stream</li> </ol> </li> <li>5. Use a different computer <ol style="list-style-type: none"> <li>a. Login a different account</li> <li>b. Go to the live stream</li> </ol> </li> </ol>
Expected Output	All clients connected will see the same live stream video and chat messages during live stream

## Stress Test Cases

Stress Test	
Test case	<b>Test 54:</b> maximum number of live stream running
Input/Steps	<ol style="list-style-type: none"><li>For each i (i = 1, 10, 100, ...)<ol style="list-style-type: none"><li>Create i courses</li><li>Call start live stream method for each course</li><li>Display i</li></ol></li><li>Record the i when server become unresponsive (the last i)</li><li>Restart server</li><li>For each j (j = 1, 2, ..., 10)<ol style="list-style-type: none"><li>Create i courses</li><li>Call start live stream method for each course</li><li>Display j</li></ol></li></ol>
Expected Output	Server becomes unresponsive at certain j. $i*j$ is the maximum number live stream can run at same time