

SecureED.

User manual

Abstract

SecureED. is a webapp that simulates a university registration system. It is an updated version of SecureED. v. 1.0 (<https://github.com/onniegit/SecureEd-1.0>). It is intended to show several common software vulnerabilities in an educational setting, and to demonstrate the correct way to address these vulnerabilities. The software also resets itself to its initial settings following a session, allowing users to try various things without worrying about destroying their installation.

This document contains the manual of how to use SecureED. The rest of the document is ordered as follows: Chapter 1 describes the system requirements. Chapter 2 contains an explanation of how to start the program. Chapter 3 describes how to utilize asymmetric encryption. Chapter 4 includes instructions for Professors to enter grades. Chapter 5 includes instructions for Students to search for and enroll in courses. Chapter 6 includes instructions for Admins to add, search and edit non-admin user accounts. Chapter 7 provides user credentials.

This document describes functionality of SecureED. v. 2.0, dated 25 April 2022.

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1 REQUIREMENTS

1.1 SYSTEM REQUIREMENTS

SecureED. is written in HTML, CSS, Javascript, and PHP, and was built and tested on Google Chrome v100 – thus, Chrome is the recommended browser. Otherwise, all libraries are included in the installation folder. Screen resolutions above 1920x1080, and aspect ratios greater than 16:9, are untested, and thus unsupported.

Required operating system: Windows 10.

Other versions of Windows are untested, and are therefore unsupported.

2 GETTING STARTED

2.1 INSTALLATION

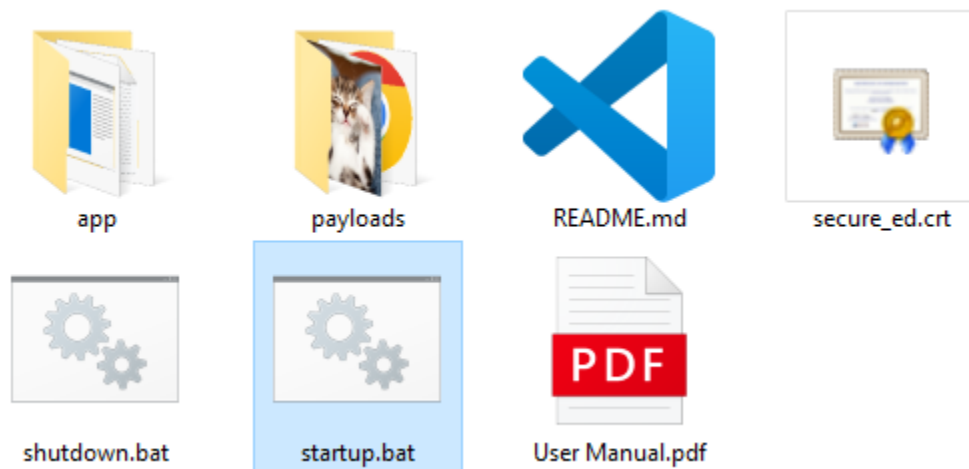
Unzip the file to the folder of your choice. All of the necessary libraries and certificates are included – no setup is required.

2.2 START-UP

SecureED. is portable, thus self-contained. To start the webserver, please do the following:

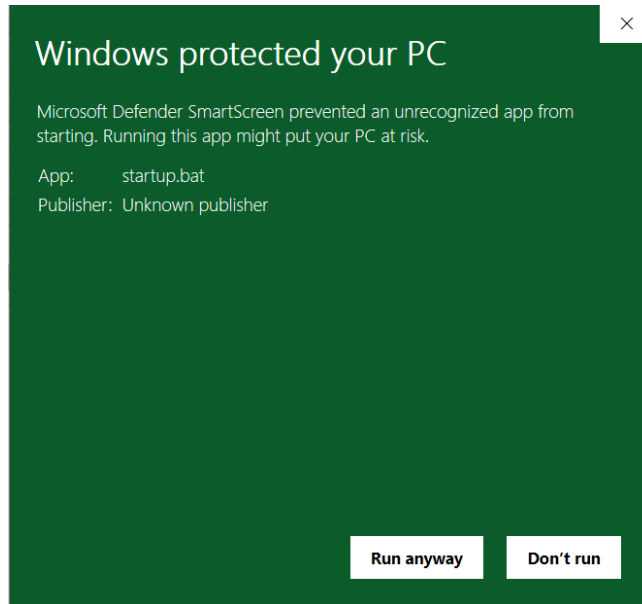
1. Navigate to the root folder of your installation.
2. Execute startup.bat, located in the SecureEd-master folder.

Figure 2.1 Startup



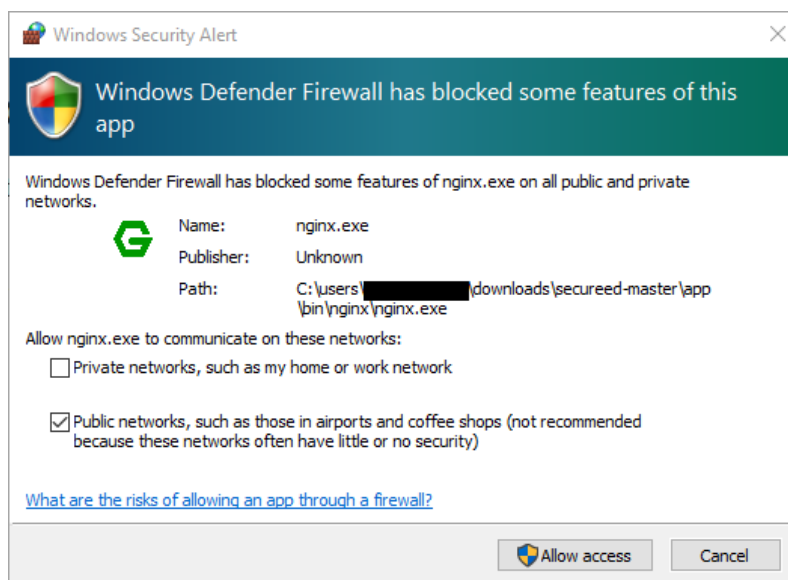
The first time you run startup.bat, Windows Defender (or other antivirus software) may warn you that the app is unrecognized and may put your PC at risk. To proceed, click 'Run anyway'.

Figure 2.2 Windows Defender Run anyway



You may also get a warning for the program that runs the web server (nginx). To continue, click 'Allow access'.

Figure 2.3 Nginx security alert



Your default browser will be opened, and you will be presented with a login screen (or a security warning). Note that a command prompt and an executable will open in the background – **DO NOT CLOSE THESE** until you want to end your session! After shutting down the server, your session will be terminated, and all data will be reset to their default values when the application is restarted.

Figure 2.3 Prompt to shut down the server

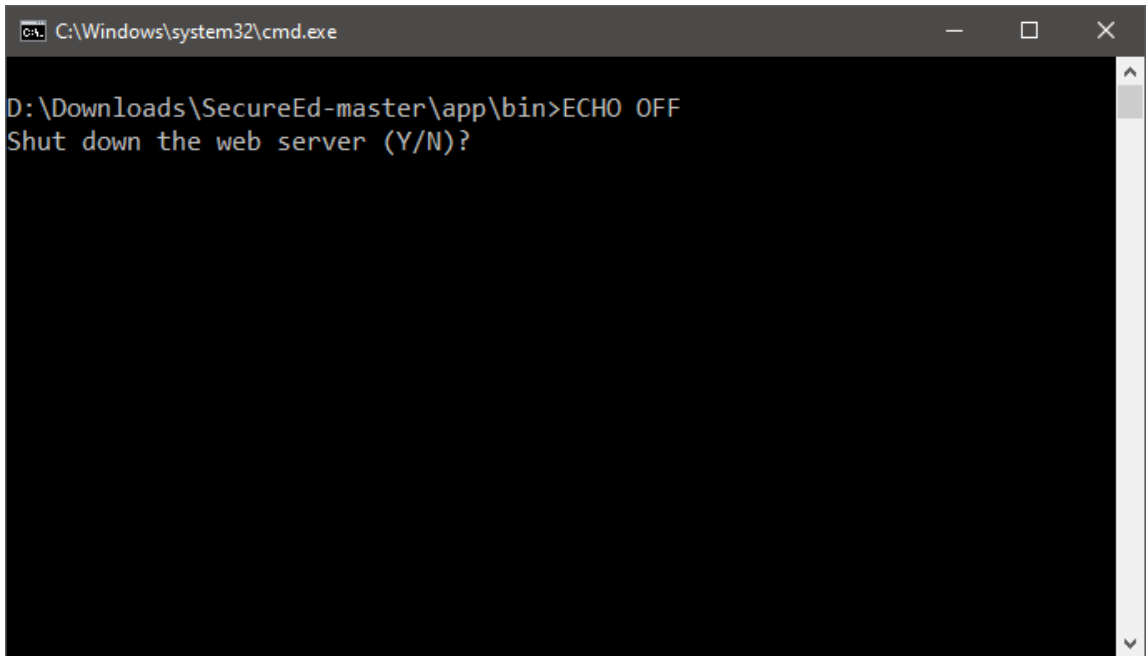
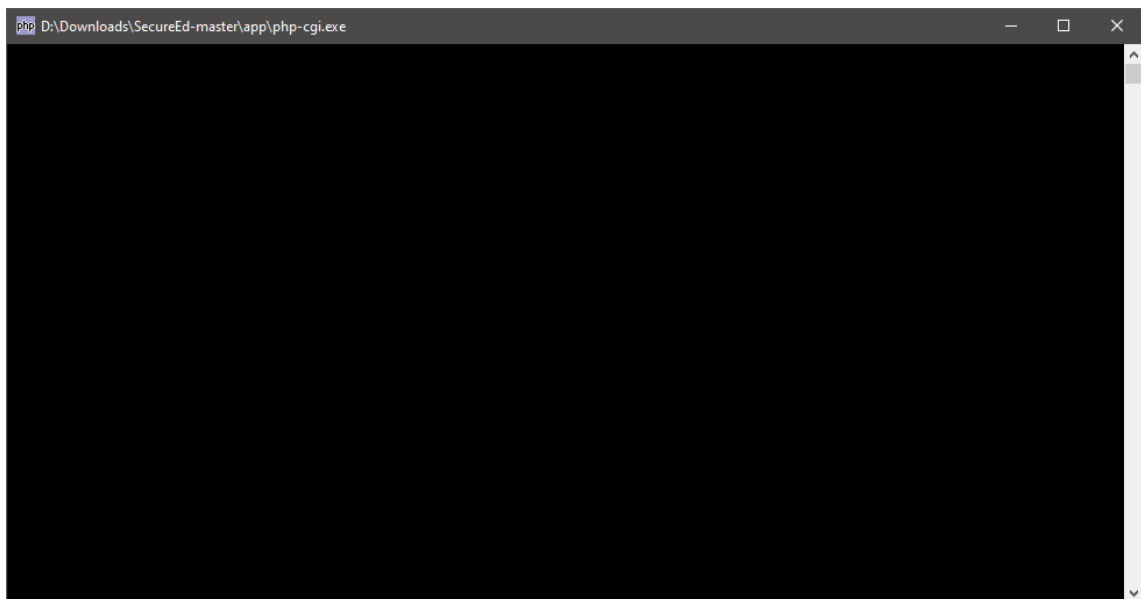
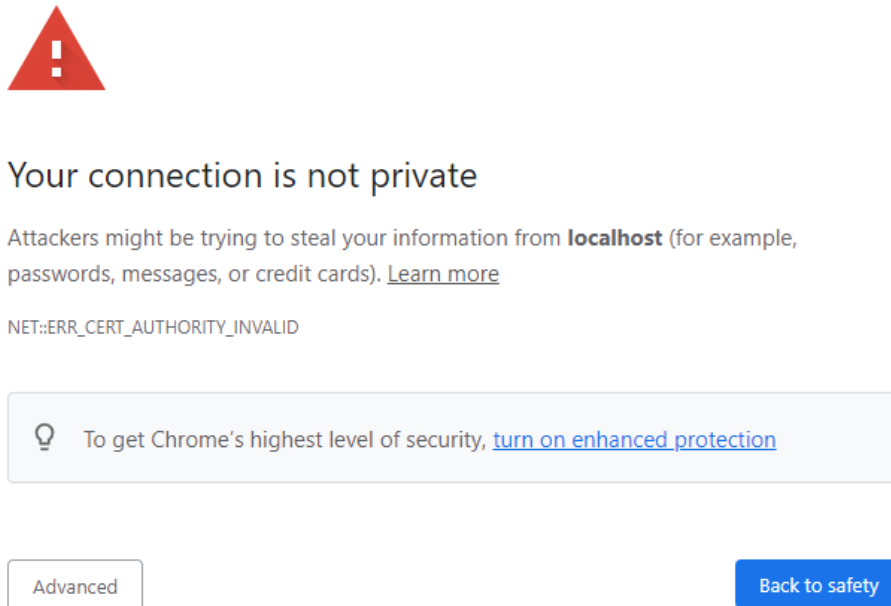


Figure 2.4 Common Gateway Interface executable



When the page opens your browser may display a page similar to this:

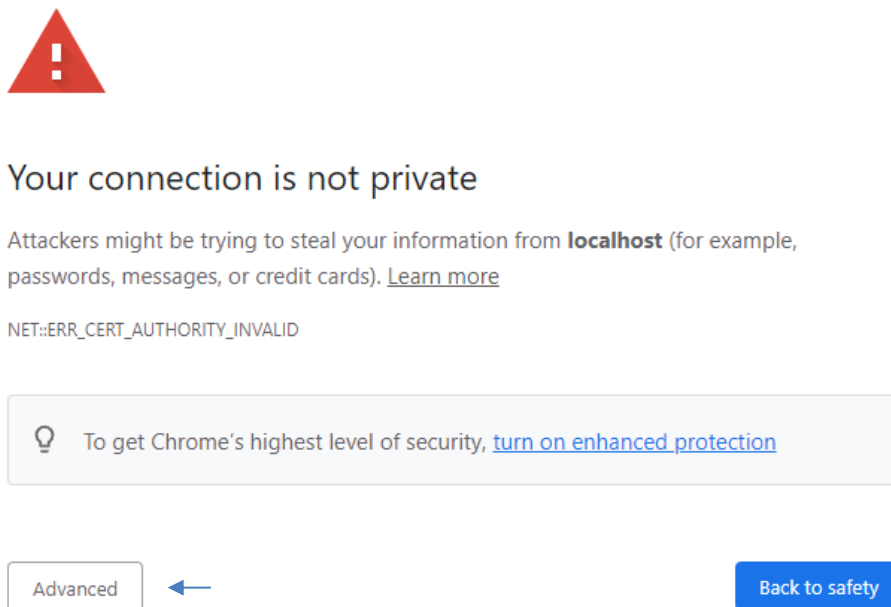
Figure 2.5 Browser security warning



In order to resolve this, you may either:

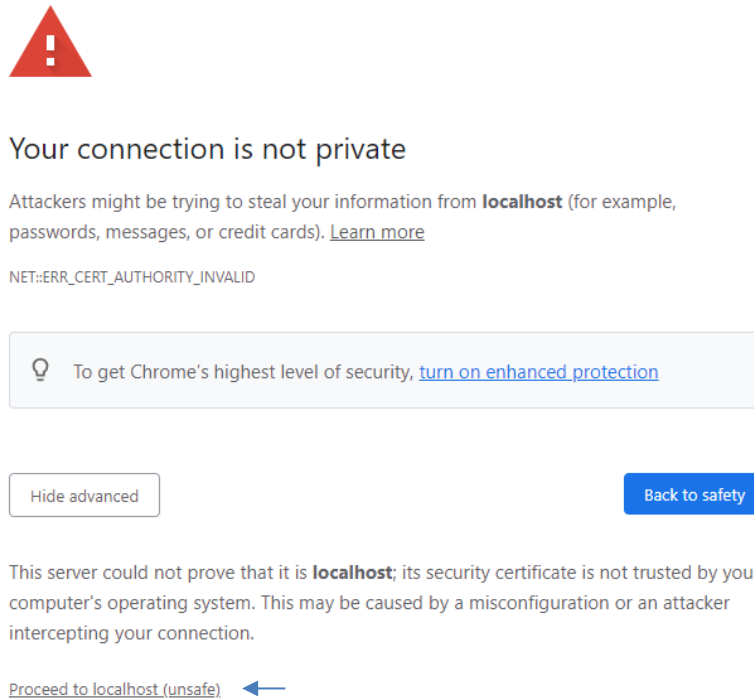
- (1) Import SecureED's certificate in your root store (see section 3.1)
- (2) Or you may ignore this warning by selecting 'Advanced':

Figure 2.6 Selecting 'Advanced'



And selecting ‘Proceed to localhost (unsafe)’:

Figure 2.7 Selecting ‘Proceed to localhost (unsafe)’



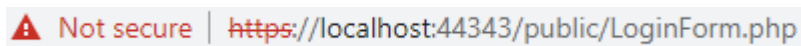
If you have followed the instructions from section 3.1, your browser should have opened the Log In page, and the address bar should look like this:

Figure 2.8 Address bar with trusted certificate



Otherwise, your browser will continue to warn you that the site is “not secure”:

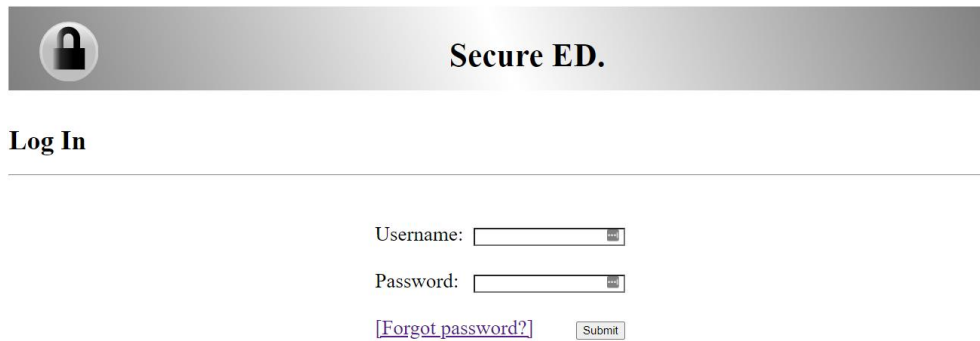
Figure 2.9 Address bar with an untrusted certificate



2.3 LOG IN

Enter a username and password into the spaces provided, and then press ‘Submit’ (See chapter 7 for login credentials).

Figure 2.10 Login Form



The login form is titled "Secure ED." and features a lock icon. Below the title is a "Log In" section. The form includes two input fields: "Username:" and "Password:". Below the "Password:" field is a link labeled "[Forgot password?]" and a "Submit" button.

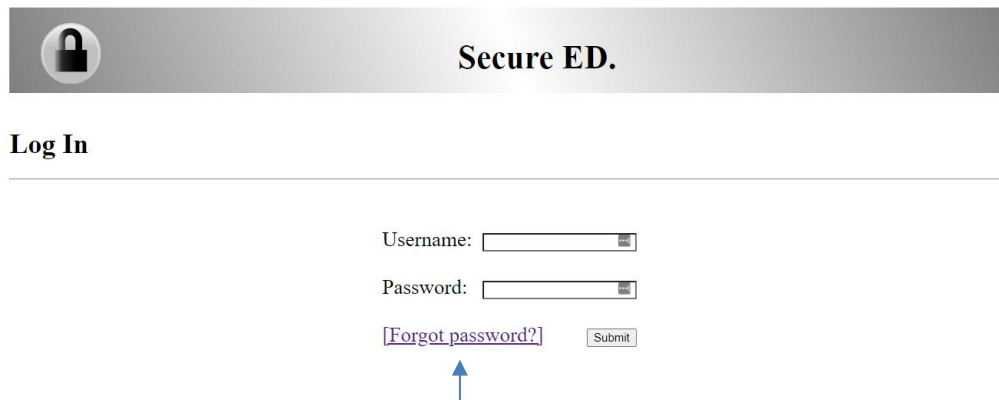
Note: If you have forgotten your credentials, please select 'Forgot password?'. See the next section for information regarding how to recover your password.

2.4 FORGOT PASSWORD

In order to recover a lost password:

1. Click 'Forgot Password?' on the Log In page.

Figure 2.11 Link to Forgot Password on Log In page



The login form is titled "Secure ED." and features a lock icon. Below the title is a "Log In" section. The form includes two input fields: "Username:" and "Password:". Below the "Password:" field is a link labeled "[Forgot password?]" and a "Submit" button. A blue arrow points to the "[Forgot password?]" link.

2. On the next page, please enter your email in the provided field, and select 'Submit'.

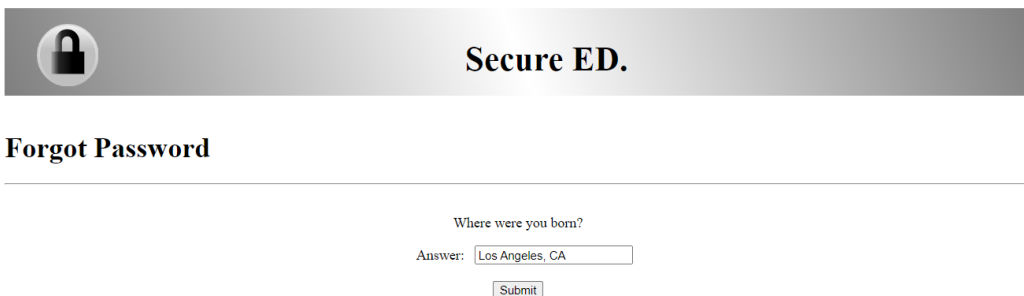
Figure 2.12 Forgot Password page



The image shows a web page header with a lock icon and the text "Secure ED.". Below the header, the title "Forgot Password" is displayed. The main content area contains the prompt "Please enter your email:", followed by an email input field with the text "student@email.com" and a "Submit" button.

3. You will then be asked the security question associated with that account.

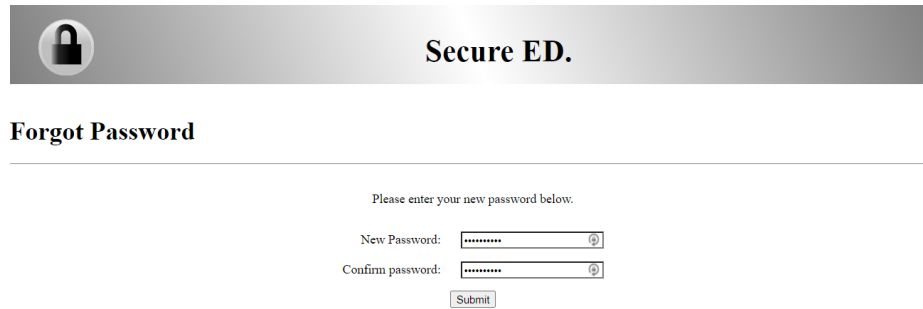
Figure 2.13 Forgot Password security question



The image shows a web page header with a lock icon and the text "Secure ED.". Below the header, the title "Forgot Password" is displayed. The main content area contains the prompt "Where were you born?", followed by an answer input field with the text "Los Angeles, CA" and a "Submit" button.

4. Enter the correct answer, and you will be taken to a page that will allow you to change your password. Your new password must be between 8 and 20 characters and contain at least one capital letter, one lowercase letter, one number, and one of the following special symbols: ! @ # \$ % ^ & *

Figure 2.14 Forgot Password password change



The image shows a web form for changing a password. At the top, there is a grey header bar with a lock icon on the left and the text "Secure ED." in the center. Below the header, the title "Forgot Password" is displayed. The main content area contains the instruction "Please enter your new password below." followed by two input fields: "New Password:" and "Confirm password:". Both fields are masked with dots and have a small icon on the right. A "Submit" button is located below the "Confirm password:" field.

Secure ED.

Forgot Password

Please enter your new password below.

New Password:

Confirm password:

Note: Be sure that the contents of the New Password and the Confirm Password fields match!

2.5 LOG OUT

After you have successfully logged in, you may log out at any time. To do so, click on the 'Log Out' button on the top pane of any page.

Figure 2.15 Logout



2.6 CLOSING THE PROGRAM

When you are ready to end your session, exit your browser and shut down the web server by entering 'Y' in the command prompt or running shutdown.bat (found in the same folder as startup.bat). The program will reset itself to its default values the next time you run startup.

Figure 2.16 Prompt to shut down the server

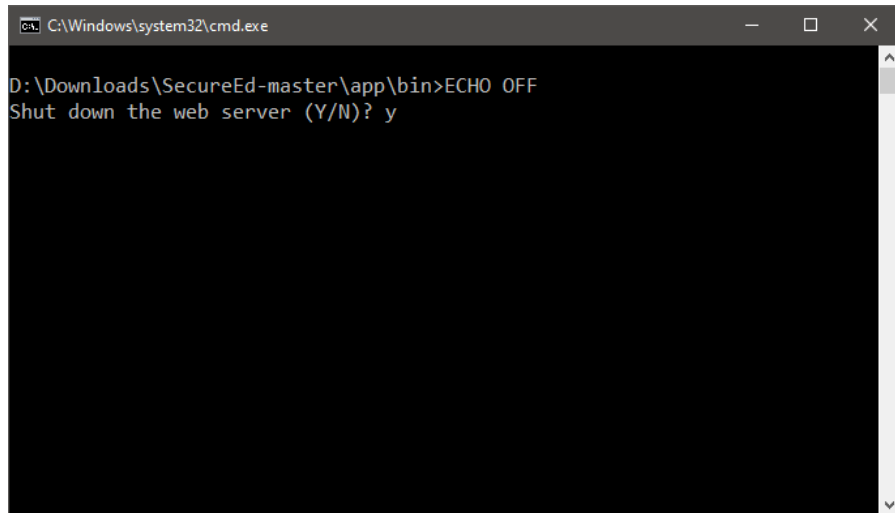
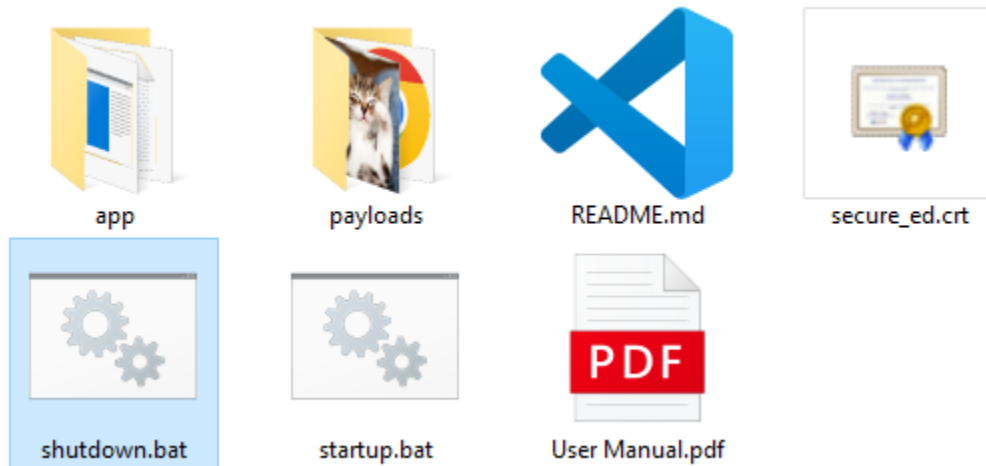


Figure 2.17 Shutdown



Note: If you shut down the web server from the command prompt, the executable php-cgi.exe will continue to run, and can now be closed manually.

3 ASYMMETRIC ENCRYPTION

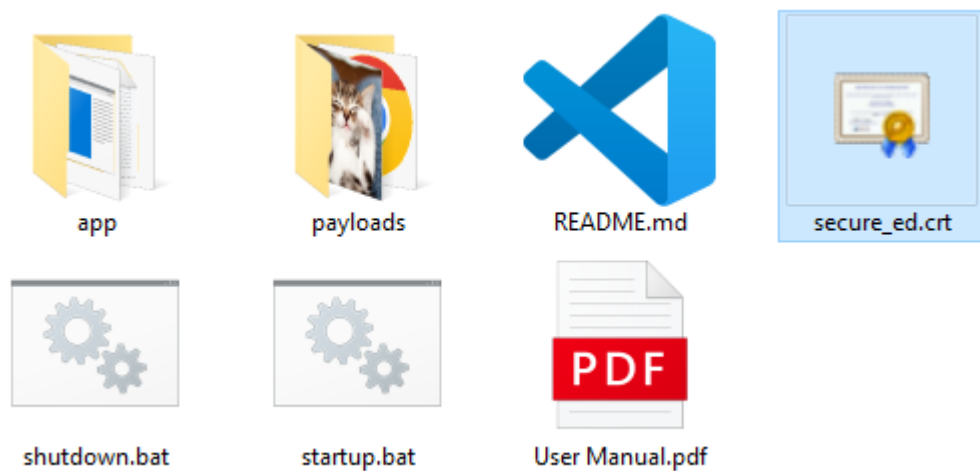
3.1 IMPORTING THE CERTIFICATE

SecureED. utilizes asymmetric encryption (also known as public-key cryptography) to secure network traffic between the client and the server. SecureED. provides both the private key and the public key (also known as a certificate) to do this.

By default, your operating system will not trust SecureED's certificate, and it must be imported into your Trusted Root Certification Authorities store. To import the certificate, please do the following:

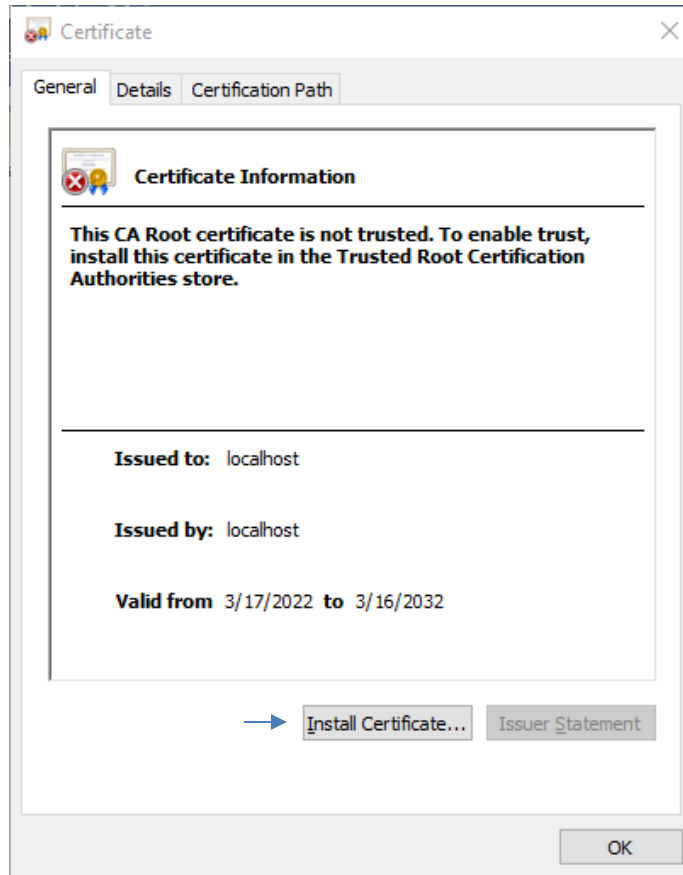
1. Double-click the certificate, located in the SecureEd-master folder.

Figure 3.1 SecureED. Certificate



2. Select 'Install Certificate...'

Figure 3.2 Selecting Install Certificate



3. Follow the instructions in the Certificate Import Wizard
 - a. Select 'Current user'. Click next.
 - b. Select 'Place all certificates in the following store'. Click 'Browse'.
 - c. Select 'Trusted Root Certification Authorities'. Click 'OK'. Click 'Next'.
 - d. Click 'Finish'.
 - e. If you are prompted with a security warning, click 'yes'.
 - f. Click 'yes'.

If you were directed to this section from section 2.2, please restart your browser (In Chrome, do this by typing "chrome://restart" in the address bar). Alternatively, shut down the server (see section 2.6) and restart the application (see section 2.2).

Note: After 3/16/2032, SecureED's certificate will have expired and your browser will now warn you that the site is "not secure" because of an invalid certificate!

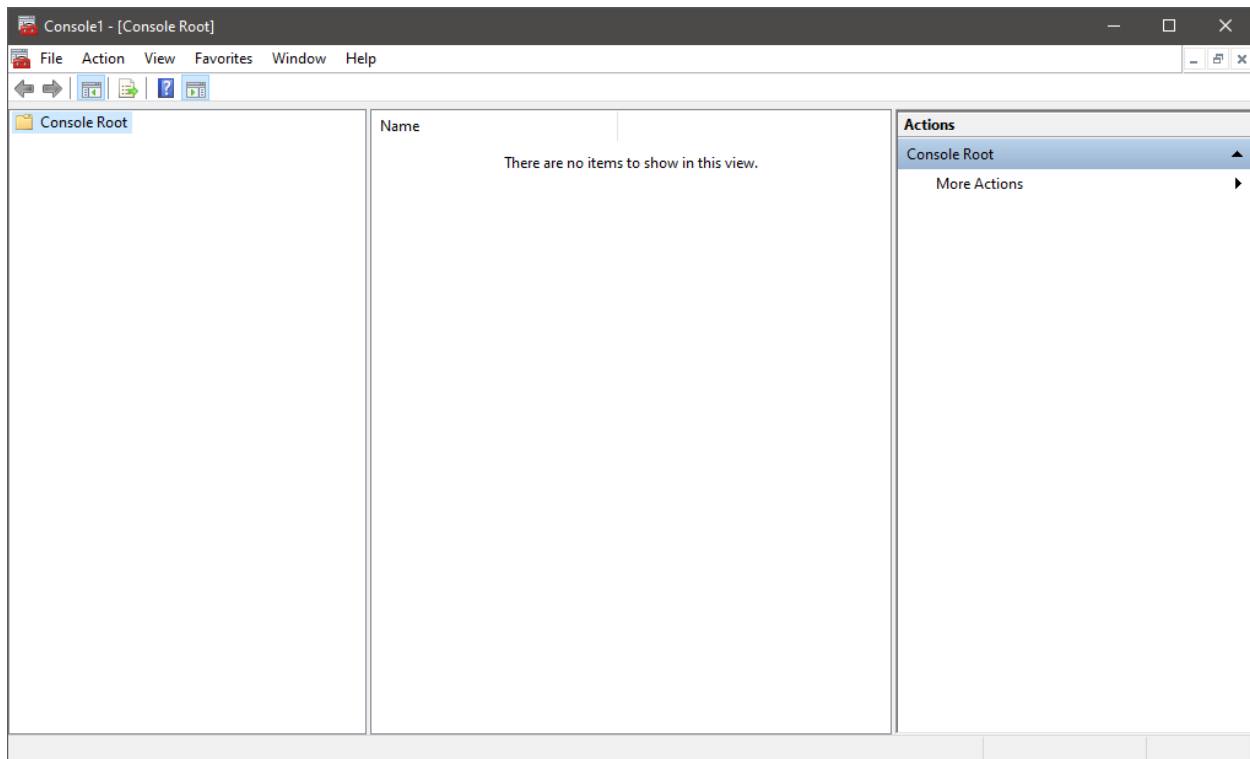
3.2 DELETING THE CERTIFICATE

When you are done using SecureED, you may want to delete its certificate from your operating system. To delete the certificate:

1. Press Windows key + R to open the run command.
2. Type 'mmc'
3. Hit enter and run the program 'Microsoft Management Console'

You should see a program that looks like this:

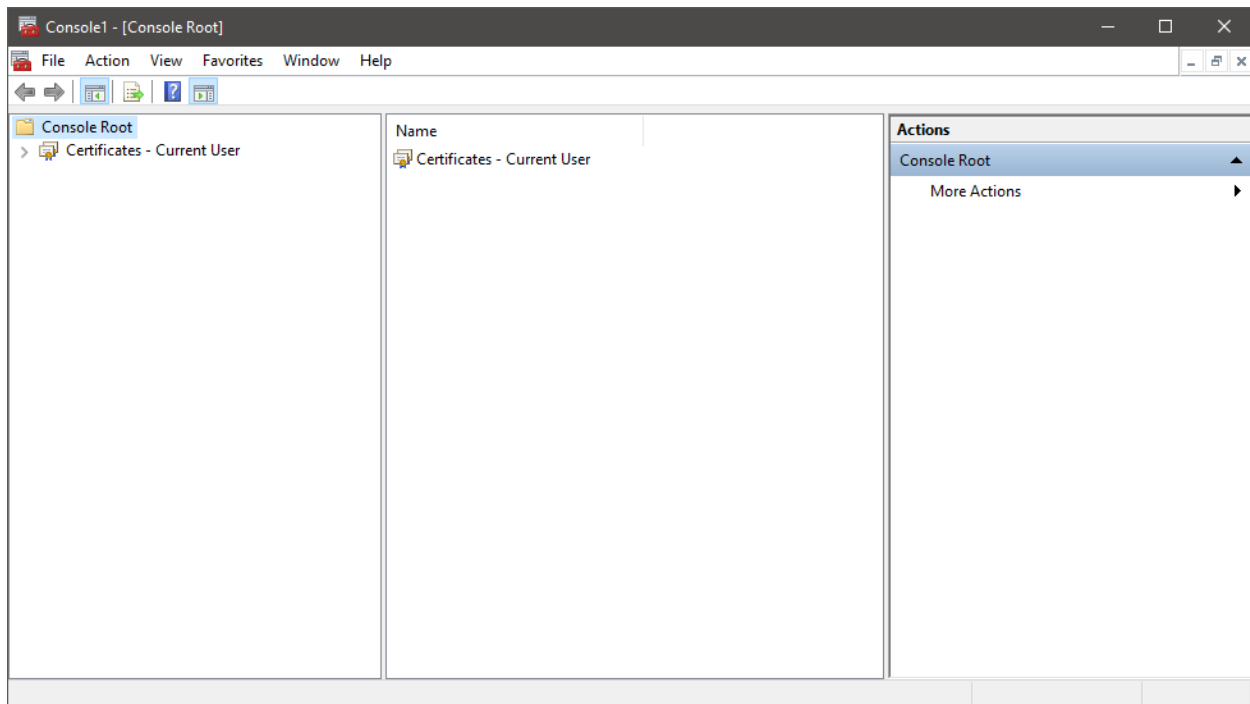
Figure 3.3 Microsoft Management Console



4. In the console, click 'File', then 'Add/Remove Snap-in...'.
5. In the 'Available snap-ins', select 'certificates'.
6. Click 'Add'.
7. Select 'My user account'. (If you imported SecureED's certificate under 'local machine', select 'computer account' instead).
8. Click 'Finish'.
9. Click 'OK'.

The console should now look like this:

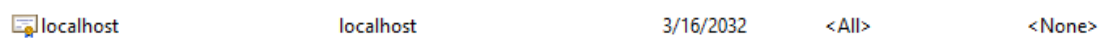
Figure 3.4 Certificates added to the console



10. Double-click 'Certificates – Current User' (or 'Certificates (Local Computer)').
11. Double-click 'Trusted Root Certification Authorities'.
12. Double-click 'Certificates'.
13. Find SecureED's certificate.

It should look like this:

Figure 3.5 SecureED's certificate



14. Right-click and delete SecureED's certificate.
15. Click 'yes'.
16. Click 'ok'.

DO NOT DELETE OTHER SYSTEM CERTIFICATES. These are other certificates that your operating system trusts.

SecureED's certificate can be identified by its Thumbprint (sha1):

1fd2df58f4563b5b5ba3b59a967bb37f23edef7d

If the certificate has this value as its thumbprint, then it is safe to delete.

Note: After you delete the certificate, your browser will begin to warn you that the site is "not secure".

3.3 CREATING YOUR OWN SELF-SIGNED CERTIFICATE

When creating a website, you may want to create your own self-signed certificate. These types of certificates are useful in development environments and internal networks because they are easy to make and cost no money to create.

To create a self-signed certificate, you will need to use a program. Here, we will use a popular program for creating certificates called OpenSSL

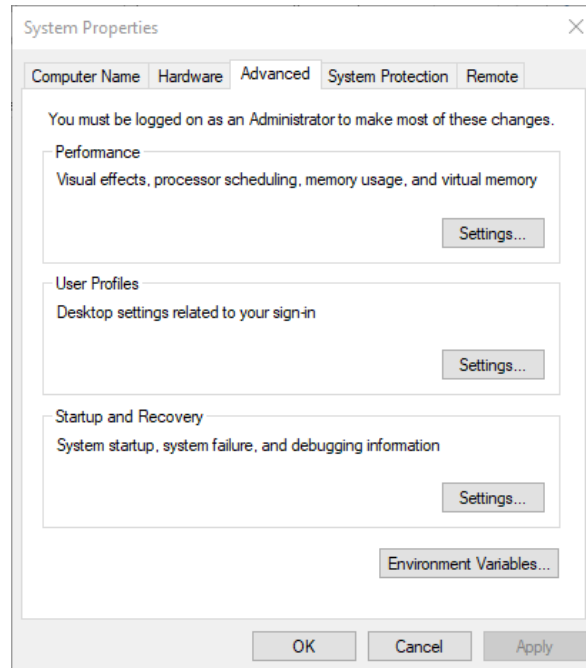
OpenSSL can be downloaded here:

<https://slproweb.com/products/Win32OpenSSL.html>

Once OpenSSL is installed you will want to add it to the Windows environment variables.

1. Press Windows key + R to open the run command.
2. Type 'SystemPropertiesAdvanced'.
3. Hit enter to open the system properties dialog box.

Figure 3.5 System Properties dialog box



4. Click 'Environment Variables...'.
5. Under 'System variables', double-click 'Path'.
6. Click 'New'.
7. Add the path to openssl.exe that you just installed.
8. Click 'OK' and close the control panel.

You should now have an installation of OpenSSL that you can use in cmd.

1. Press Windows key + R to open the run command
2. Type 'cmd'.
3. Hit enter to run the Windows Command Prompt.
4. Enter the command:

openssl version

To see if you have a valid installation of OpenSSL .

5. You can now use OpenSSL commands to create your own self-signed certificates.
SecureED's self-signed certificate was created with the following commands:

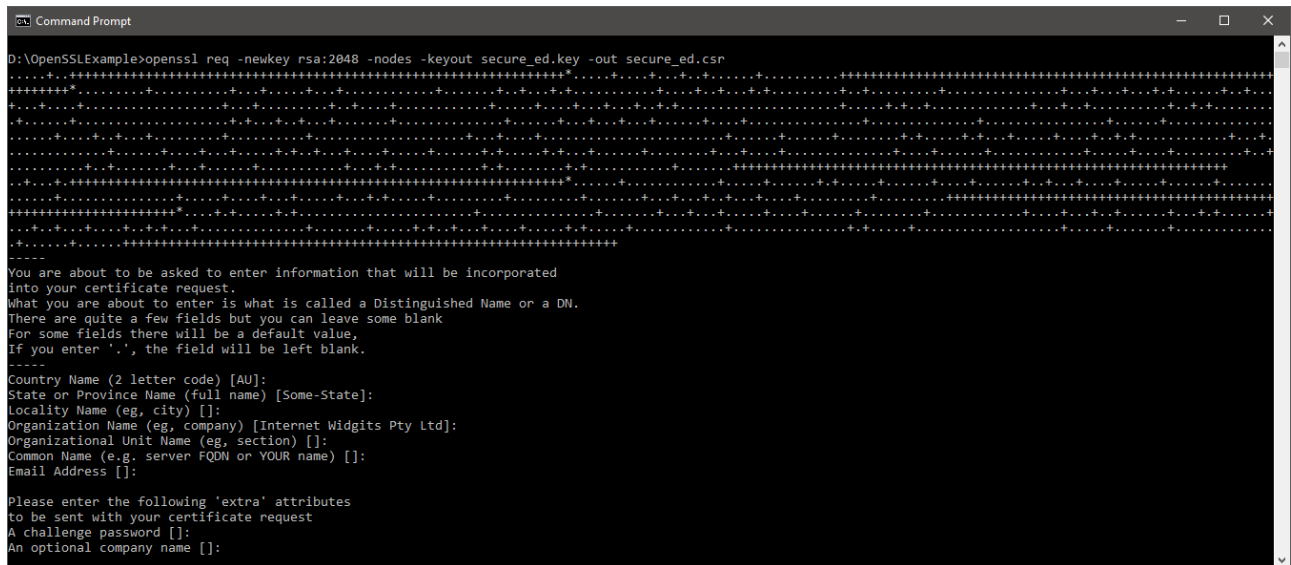
```
openssl req -newkey rsa:2048 -nodes -keyout secure_ed.key -out secure_ed.csr
```

```
openssl x509 -signkey secure_ed.key -in secure_ed.csr -req -days 3652 -extfile v3.ext -out secure_ed.crt -days 3652
```

Note: In order to run these example commands, the extension file v3.ext must exist in the current directory. This file is provided in the SecureEd-master folder. Simply copy the file into the directory you wish to use and run the above commands.

When you run the first command, you will be prompted to enter some information for your certificate request. You may enter information into these fields, or leave them blank by simply hitting enter.

Figure 3.6 Entering information with OpenSSL



```
Command Prompt
D:\OpenSSLExample>openssl req -newkey rsa:2048 -nodes -keyout secure_ed.key -out secure_ed.csr
+++++
.....
+++++
-----
You are about to be asked to enter information that will be incorporated
into your certificate request.
What you are about to enter is what is called a Distinguished Name or a DN.
There are quite a few fields but you can leave some blank
For some fields there will be a default value,
If you enter '.', the field will be left blank.
-----
Country Name (2 letter code) [AU]:
State or Province Name (full name) [Some-State]:
Locality Name (eg, city) []:
Organization Name (eg, company) [Internet Widgits Pty Ltd]:
Organizational Unit Name (eg, section) []:
Common Name (e.g. server FQDN or YOUR name) []:
Email Address []:

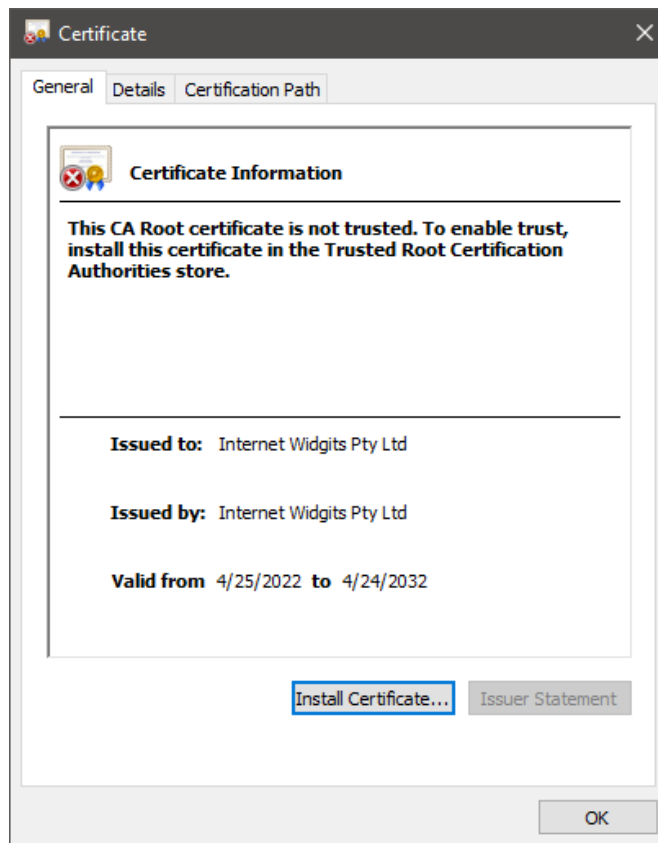
Please enter the following 'extra' attributes
to be sent with your certificate request
A challenge password []:
An optional company name []:
```

After running the second command, you should have generated three files:

- (1) The private key: secure_ed.key
- (2) The certificate signing request: secure_ed.csr
- (3) The public key (certificate): secure_ed.crt

And if you double-click the certificate, it should contain the information you generated it with. By default, it will have an organization name of Internet Widgits Pty Ltd and an expiration of ten years.

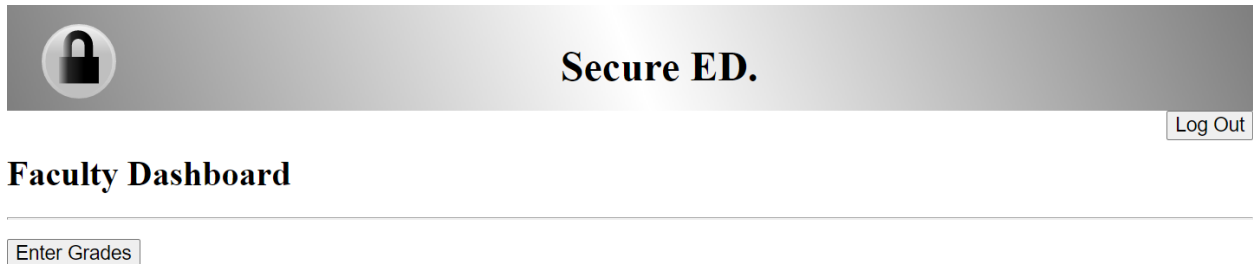
Figure 3.7 Newly generated certificate



4 FACULTY

4.1 DASHBOARD

Figure 4.1 Faculty Dashboard



4.2 ENTER GRADES

4.2.1 DESCRIPTION

The Enter Grades functionality allows a faculty member to add final grades to a course, using a .csv (comma-separated values) file.

4.2.2 CSV FORMAT

Uploaded files must be comma separated text values, in the following format:

```
USER_ID,GRADE
USER_ID,GRADE
USER_ID,GRADE
...
```

e.g.:

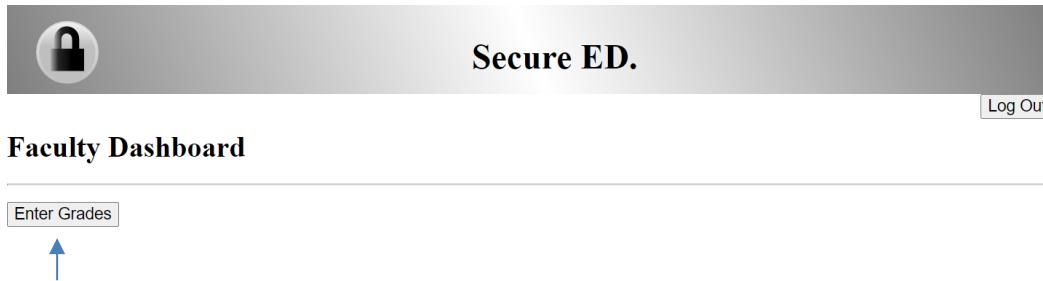
```
927066652,A
927190481,F
927201552,C
927237023,B
927369978,D
927410321,F
927512079,A
927535222,A
927565074,B
927600214,C
927620146,A
```

927671464,F
927694539,C
927790514,B

4.2.3 INSTRUCTIONS

1. From the Dashboard, select 'Enter Grades'.

Figure 4.2 Enter Grades selection



2. On the following page, enter the Course ID (CRN).

Figure 4.3 Enter Grades page

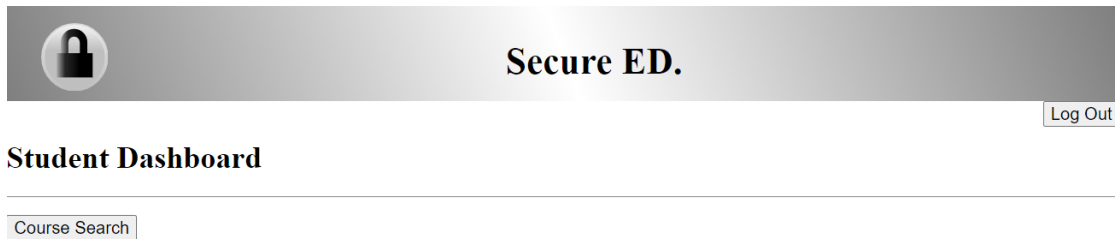
The image shows a web interface for 'Secure ED.' with a grey header bar containing a lock icon and the text 'Secure ED.' and buttons for 'Dashboard' and 'Log Out'. Below the header is a section titled 'Enter Grades'. Under this title, there is a form with a 'Course ID:' label and a text input field containing '12345'. Below the input field is a 'Browse...' button with the text 'No file selected.' to its right. At the bottom of the form are 'Submit' and 'Cancel' buttons.

3. Select "Browse".
4. Select a .csv file from your computer (see 3.2.2 for correct formatting).
5. Select submit to upload the file.

5 STUDENTS

5.1 DASHBOARD

Figure 5.1 Student Dashboard



The screenshot shows the top of the Student Dashboard. It features a header bar with a lock icon and the text "Secure ED." on the left, and a "Log Out" button on the right. Below the header, the title "Student Dashboard" is displayed. Underneath the title is a "Course Search" button.

5.2 COURSE SEARCH

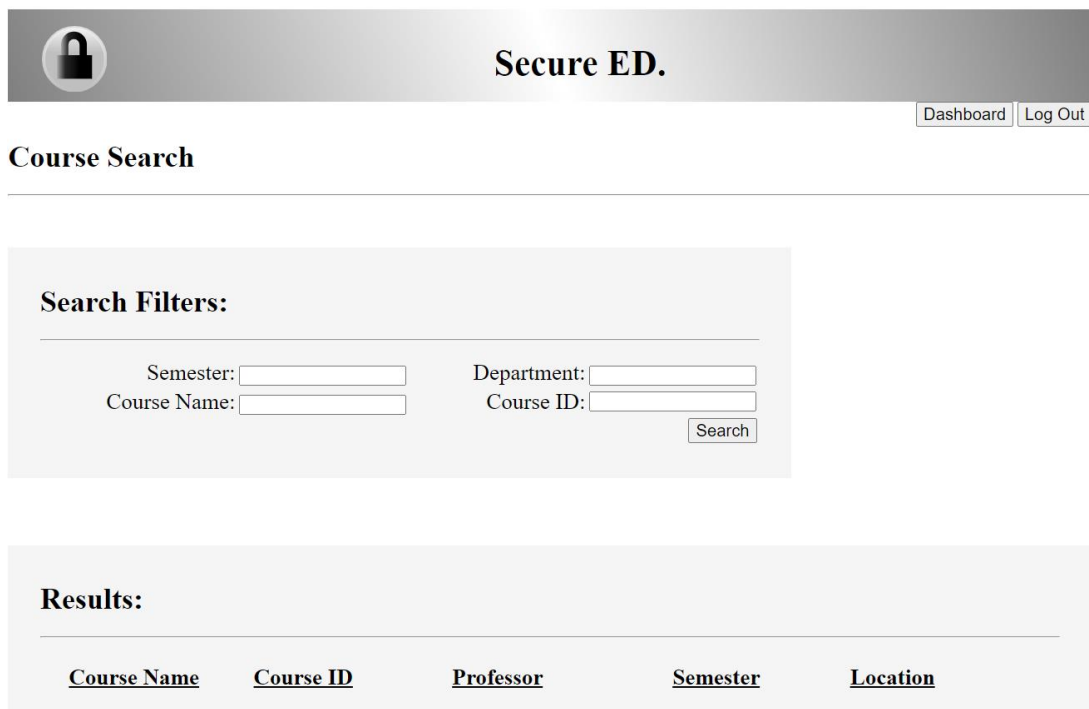
5.2.1 DESCRIPTION

Course search allows students to find current, past and future courses.

5.2.2 INSTRUCTIONS

1. From the Dashboard, select 'Course Search'.
2. On the following page, enter information relevant to the course you may be interested in.

Figure 5.2 Course Search page



The screenshot shows the Course Search page. It has a header bar with a lock icon and "Secure ED." on the left, and "Dashboard" and "Log Out" buttons on the right. The title "Course Search" is below the header. The main content area is divided into two sections: "Search Filters:" and "Results:". The "Search Filters:" section contains four input fields: "Semester:", "Department:", "Course Name:", and "Course ID:". A "Search" button is located to the right of the "Course ID:" field. The "Results:" section is currently empty, showing only the header for the results table.

<u>Course Name</u>	<u>Course ID</u>	<u>Professor</u>	<u>Semester</u>	<u>Location</u>
--------------------	------------------	------------------	-----------------	-----------------

3. Select search.

Figure 5.3 Filtering and searching for courses

Course Search

Search Filters:

Semester:

Department:

Course Name:

Course ID:

→

Search

Results:

<u>Course Name</u>	<u>Course ID</u>	<u>Professor</u>	<u>Semester</u>	<u>Location</u>	
Intro to CyberSecurity	123	gsinclair@email.com	Fall 2030	Building A	<input type="button" value="Enroll"/>
Intro to CyberSecurity	1343	gsinclair@email.com	Fall 2030	Building X	<input type="button" value="Enroll"/>
Intermediate CyberSecurity II	5000	scienceguy@email.com	Fall 2030	Building X	<input type="button" value="Enroll"/>

4. For a list of sections, select enroll.

Figure 5.4 Selecting a course to enroll in

Semester

Location

Fall 2030

Building A

Fall 2030

Building X

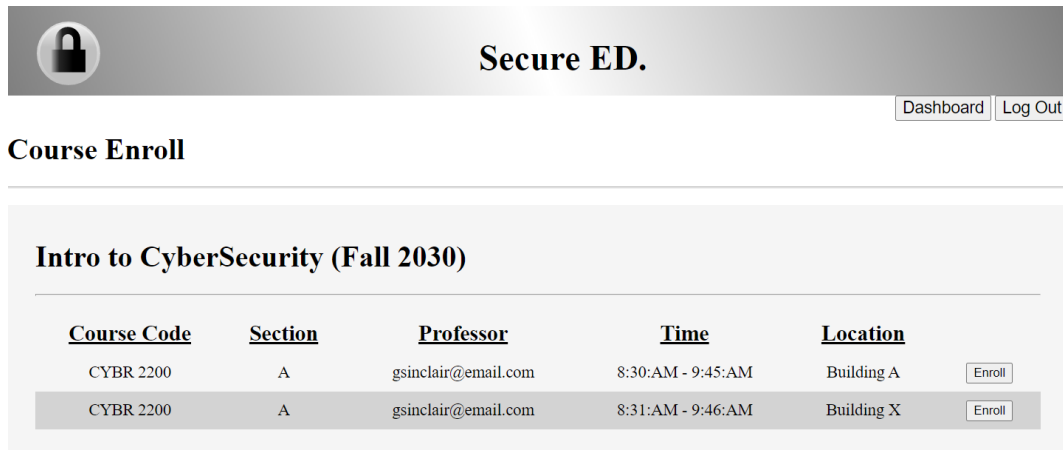
→

Fall 2030

Building X

5. You will be presented with a list of sections to browse.

Figure 5.5 Enrolling in a section of a course



The screenshot shows the 'Secure ED.' interface. At the top, there is a header bar with a lock icon and the text 'Secure ED.'. To the right of the header are two buttons: 'Dashboard' and 'Log Out'. Below the header, the page title is 'Course Enroll'. The main content area is titled 'Intro to CyberSecurity (Fall 2030)'. It contains a table with the following columns: 'Course Code', 'Section', 'Professor', 'Time', and 'Location'. There are two rows of data, each with an 'Enroll' button to its right.

<u>Course Code</u>	<u>Section</u>	<u>Professor</u>	<u>Time</u>	<u>Location</u>	
CYBR 2200	A	gsinclair@email.com	8:30:AM - 9:45:AM	Building A	<input type="button" value="Enroll"/>
CYBR 2200	A	gsinclair@email.com	8:31:AM - 9:46:AM	Building X	<input type="button" value="Enroll"/>

Note: If you don't wish to enroll at this time, you can always select 'Dashboard' to return to your landing page without enrolling in a class!

5.3 COURSE ENROLL


5.3.1 DESCRIPTION

After finding a course using Course Search, a student can enroll in a section of the course.

5.3.2 INSTRUCTIONS

1. Find a course per the instructions in 4.2.2.
2. Select "Enroll" to bring up a list of sections.
3. Select "Enroll" next to the section you wish to enroll in.

Figure 5.6 Course enroll

**Secure ED.**

DashboardLog Out

Course Enroll

Intro to CyberSecurity (Fall 2030)

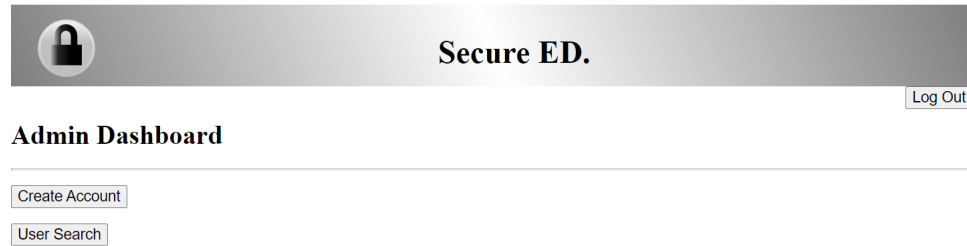
<u>Course Code</u>	<u>Section</u>	<u>Professor</u>	<u>Time</u>	<u>Location</u>	
CYBR 2200	A	gsinclair@email.com	8:30:AM - 9:45:AM	Building A	→ <input type="button" value="Enroll"/>
CYBR 2200	A	gsinclair@email.com	8:31:AM - 9:46:AM	Building X	<input type="button" value="Enroll"/>

You will automatically be returned to your dashboard.

6 ADMINISTRATORS

6.1 DASHBOARD

Figure 6.1 Admin Dashboard



6.2 CREATE ACCOUNT

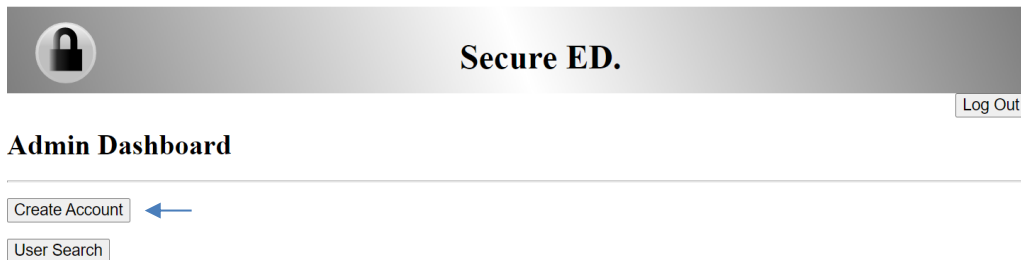
6.2.1 DESCRIPTION

Allows the administrator account to create new accounts for new users. This is the only way to create a new account!

6.2.2 INSTRUCTIONS

1. From the Dashboard, select 'Create Account'.

Figure 6.2 Create Account selection



2. On the following page, select the account type.
Note: Admin accounts cannot be created!

Figure 6.3 Create Account page

Secure ED.

[Dashboard](#) [Log Out](#)

Create Account

Account type: Faculty

First Name: Last Name:

Date of Birth:

Rank: Instructor

Email:

Confirm Email:

Password:

Confirm Password:

Security Question:

Answer:

[Submit](#) [Cancel](#)

3. Enter the user's:
 - First and Last Name
 - Date of Birth
 - Rank (faculty) or Year (students)
 - Email
 - Password
 - Security Question
 - Answer (to Security Question)
4. Confirm the user's e-mail and password, and re-enter them in their respective confirmation fields.
5. Select 'Submit'.

6.3 USER SEARCH

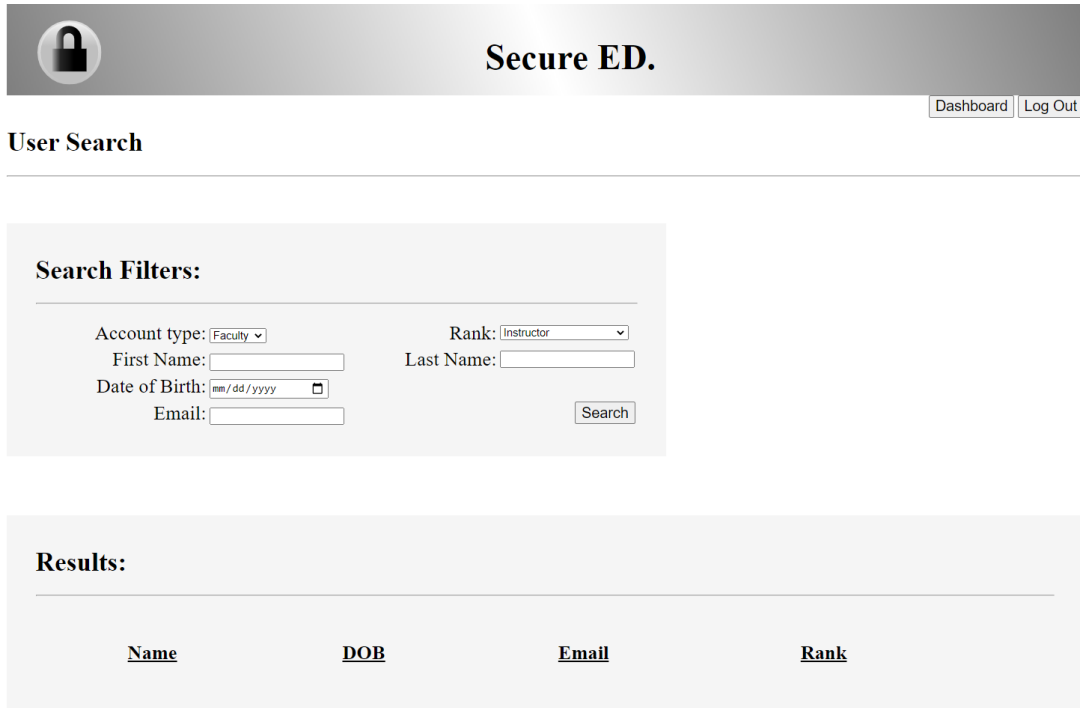
6.3.1 DESCRIPTION

Allows administrators to search for users using filters.

6.3.2 INSTRUCTIONS

1. From the Dashboard, select 'User Search'.
2. Select an account type, and a Rank (faculty) or Year (students).
Note: These two fields are mandatory!

Figure 6.4 User Search page



The screenshot shows the 'User Search' page within the 'Secure ED.' system. At the top, there is a header bar with a lock icon and the text 'Secure ED.'. To the right of the header are links for 'Dashboard' and 'Log Out'. Below the header, the page title 'User Search' is displayed. The main content area is divided into two sections: 'Search Filters:' and 'Results:'. The 'Search Filters:' section contains several input fields: 'Account type:' with a dropdown menu set to 'Faculty', 'Rank:' with a dropdown menu set to 'Instructor', 'First Name:', 'Last Name:', 'Date of Birth:' with a date picker set to 'mm/dd/yyyy', and 'Email:'. A 'Search' button is located to the right of the 'Email' field. The 'Results:' section is currently empty, showing only the column headers: 'Name', 'DOB', 'Email', and 'Rank'.

<u>Name</u>	<u>DOB</u>	<u>Email</u>	<u>Rank</u>
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3. Enter any more relevant information into the fields provided.
4. Select 'Search'.

Figure 6.5 Filter and search for users

Search Filters:

Account type: Student

Year: Freshman

First Name:

Last Name:

Date of Birth:

Email:

→

Search

Results:

<u>Name</u>	<u>DOB</u>	<u>Email</u>	<u>Year</u>	
Main, Wallace	6/20/1975	wmain@email.com	Freshman	<div>Edit</div>
Burton, Evelyn	5/21/1981	eburton@email.com	Freshman	<div>Edit</div>
Hargrove, Wendell	8/9/1971	whargrove@email.com	Freshman	<div>Edit</div>
Dagreenia, John	2/2/1960	jdagreenia@email.com	Freshman	<div>Edit</div>

A list of matching accounts will appear below.

6.4 EDIT ACCOUNT

6.4.1 DESCRIPTION


Allows an administrator to edit a non-administrator account.

6.4.2 INSTRUCTIONS

1. Find a user per the instructions in 5.3.2.
2. Select 'Edit' to the right of the user's information.

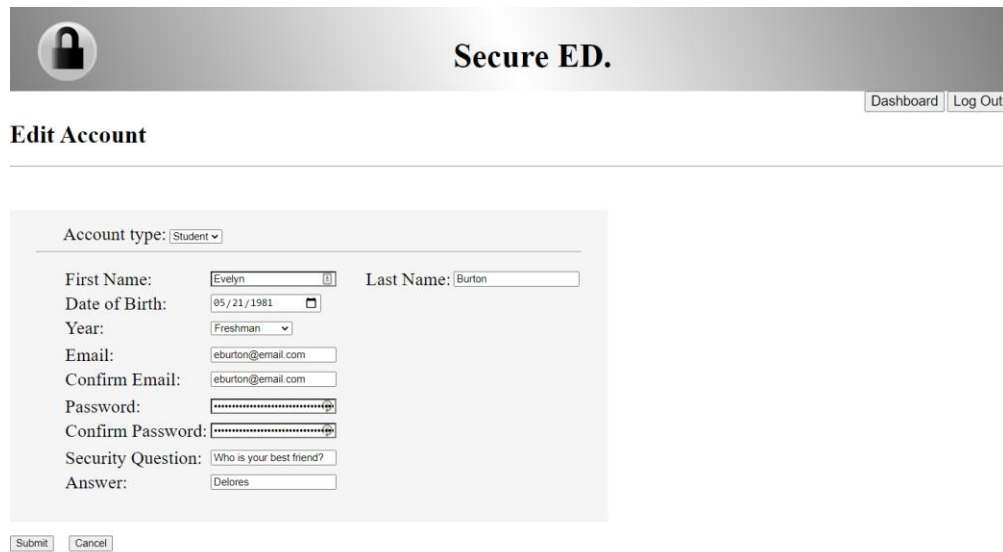
Figure 6.6 Edit Account selection

Results:

<u>Name</u>	<u>DOB</u>	<u>Email</u>	<u>Year</u>	
Main, Wallace	6/20/1975	wmain@email.com	Freshman	<input type="button" value="Edit"/>
Burton, Evelyn	5/21/1981	eburton@email.com	Freshman	 <input type="button" value="Edit"/>
Hargrove, Wendell	8/9/1971	whargrove@email.com	Freshman	<input type="button" value="Edit"/>
Degreenia, John	2/2/1960	jdegreenia@email.com	Freshman	<input type="button" value="Edit"/>
Simpson, Nestor	4/9/1959	nsimpson@email.com	Freshman	<input type="button" value="Edit"/>
Neff, James	10/18/1954	jneff@email.com	Freshman	<input type="button" value="Edit"/>

3. Make any desired changes to the prepopulated data in the fields provided.

Figure 6.7 Entering information for a new account



The screenshot shows a web interface for 'Secure ED.'. At the top, there is a header bar with a lock icon and the text 'Secure ED.'. To the right of the header are links for 'Dashboard' and 'Log Out'. Below the header, the page title is 'Edit Account'. The main form area is titled 'Account type: Student' with a dropdown menu. The form contains the following fields: 'First Name' (Evelyn), 'Last Name' (Burton), 'Date of Birth' (05/21/1981), 'Year' (Freshman), 'Email' (eburton@email.com), 'Confirm Email' (eburton@email.com), 'Password' (masked with asterisks), 'Confirm Password' (masked with asterisks), 'Security Question' (Who is your best friend?), and 'Answer' (Delores). At the bottom of the form are 'Submit' and 'Cancel' buttons.

Account type: Student

First Name: Evelyn Last Name: Burton

Date of Birth: 05/21/1981

Year: Freshman

Email: eburton@email.com

Confirm Email: eburton@email.com

Password: [masked]

Confirm Password: [masked]

Security Question: Who is your best friend?

Answer: Delores

Submit Cancel

Note: Don't forget to confirm any changes to the e-mail or password!

4. Select 'Submit'.

7 USER CREDENTIALS

Figure 7.1 User Credentials

Account Type	Username	Password	Security Question	Security Answer
Faculty	scienceguy@email.com	Password2!	Favorite Relative?	Charity Nye
Student	student@email.com	Password5!	Where were you born?	Los Angeles, CA
Admin	admin@email.com	Password1!	How many siblings do you have?	0