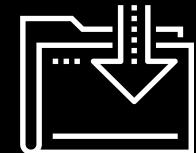




Project Week: Securing Cloud Applications

Cybersecurity
Project 1





WELCOME



This week, you will use Microsoft Azure to build and host your own web application, secure it with an SSL certificate, and add security features to protect it.

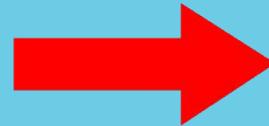


In order to secure a web application,
we'll first need to build one.
So, what web application will
we secure this week?

Digital Resumes and Blogs

A Personal Resume and Blog

While it is common for cyber and IT professionals to use standard paper resumes to illustrate their education and work history, it is becoming more common for them to use web applications to showcase their skills.



Digital Resumes and Blogs

These web applications often use the following features to showcase a person's experience, written communication skills, and past projects:



Digital Resumes

A digital introduction to a candidate—a resume, but online.

Often used by web developers to showcase development skills, cyber professionals can apply security features to these web applications to showcase their skills.

Digital resumes can include interactive features that are not available on a standard resume, such as videos.



Taylor
Fernandez

Network Security
Engineer

TFernandez@gmail.com

Develop, implement, monitor, and support information systems security programs

Technology Skills

Security: Advanced user of intrusion-detection, IDS/IPS, DLP, SIEM, vulnerability-scanning, Web gateway, proxy appliances, and antivirus tools

Systems: Experience working in mixed Windows/Linux, database, and virtualized/physical server environments

Programming: Knowledge of C, JavaScript, jQuery, PHP, Perl, HTML5, CSS, MySQL

Experience

ABC Security, Smithtown, NY | 6/2018 to Present

IT Security Specialist

Oversee security of the cloud infrastructure, serving as the main point of contact for investigating and resolving security-related issues. Develop threat and vulnerability management policies and manage SEM (security event management) system.

GitHub Portfolios

GitHub portfolios are similar to digital resumes, but they use an interface called GitHub that breaks out projects into directories to showcase different projects or code.

The screenshot shows a GitHub repository page for **jsmithson / Cyber-Security-Portfolio**. The repository is public and has 1 watch, 0 stars, and 0 forks. The main navigation tabs are Code, Issues, Pull requests, Actions, Projects, Wiki, Security, and Insights. The Code tab is selected. Below the tabs, there are buttons for master branch, 2 branches, 0 tags, Go to file, Add file, and Code. The main content area displays a list of recent commits:

Commit	Message	Date
Cryptography	Update README.MD	1 month ago
Governance_Risk_and_Com...	Create README.md	13 months ago
Logs/Regex	Add files via upload	11 months ago
Networks	Update README.md	13 months ago
Systems	Add files via upload	10 months ago
README.md	Update README.md	13 months ago

On the right side, there are sections for About, Releases, and Packages. The About section contains a bio: "Portfolio highlighting my progress learning fundamental cyber security concepts". The Releases section says "No releases published". The Packages section says "No packages published".

Blogs

Blogs can be used to share articles and discussion topics to engage with a network and community.

The screenshot shows the homepage of KrebsOnSecurity.com. At the top, the site's name "KrebsonSecurity" is displayed in large, bold, white letters on a dark background, with the subtitle "In-depth security news and investigation" below it. To the right of the title is a portrait of Brian Krebs. Social media sharing icons for Twitter, RSS, and LinkedIn are located in the top right corner. A navigation bar at the bottom of the header includes links for "HOME" (which is highlighted in orange), "ABOUT THE AUTHOR", and "ADVERTISING/SPEAKING".

The main content area features a large, bold headline: "Microsoft: Attackers Exploiting Windows Zero-Day Flaw". Below the headline is the date "September 8, 2021" and a link to "20 Comments". The article summary states: "Microsoft Corp. warns that attackers are exploiting a previously unknown vulnerability in Windows 10 and many Windows Server versions to seize control over PCs when users open a malicious document or visit a booby-trapped".

To the right of the main content is a vertical sidebar labeled "Advertisement". It features an image of a robotic head with glowing yellow eyes and text for "cybereason" and "Live cyber attack simulation. WATCH A MALICIOUS OPERATION ATTACK A NETWORK. Register".

For your first project,
you'll combine many
of the topics that you learned
in previous units in
order to create, deploy,
and secure your very own
live web application—
a cyber blog!



This Week's Daily Structure

Project week will run differently than our previous classes. Each day will include:

Brief Lecture

We will begin with a brief lecture introducing some new concepts.

Brief Overview

Then, we'll review the daily project tasks.

Daily Guides

Finally, you'll use a guide to complete the project tasks during the remaining class time.

Each guide will conclude with review questions, which you'll submit at the end of the project.

Independent vs. Group Work

Each student must complete and submit their own web application.



However, you can work through tasks with other students if you wish.



This Week's Objectives

-  Deploy web applications using Microsoft Azure Cloud.
-  Deploy Docker containers to create web applications.
-  Configure front-end code on the web application.
-  Use Azure Cloud to create a domain for the web application.
-  Modify DNS records on the cloud application.
-  Create self-signed SSL certificates using OpenSSL.
-  Add certificates to the cloud Key Vault.
-  Bind certificates to the web application.
-  Utilize cloud security services to protect the web application.

Daily Objectives and Milestones

This week will proceed as follows.

Day 1

You will build, host, and design your own web application.

Topics covered:

Networking, cloud, and web development

Day 2

You will secure your web application with SSL certificates.

Topics covered:

Cryptography and terminal

Day 3

You will protect your web application with Azure security features.

Topics covered:

Network and cloud security

Daily Objectives and Milestones

You should aim to have the following work done by the end of each day:

01

Complete the build, host, and design of your web application.

02

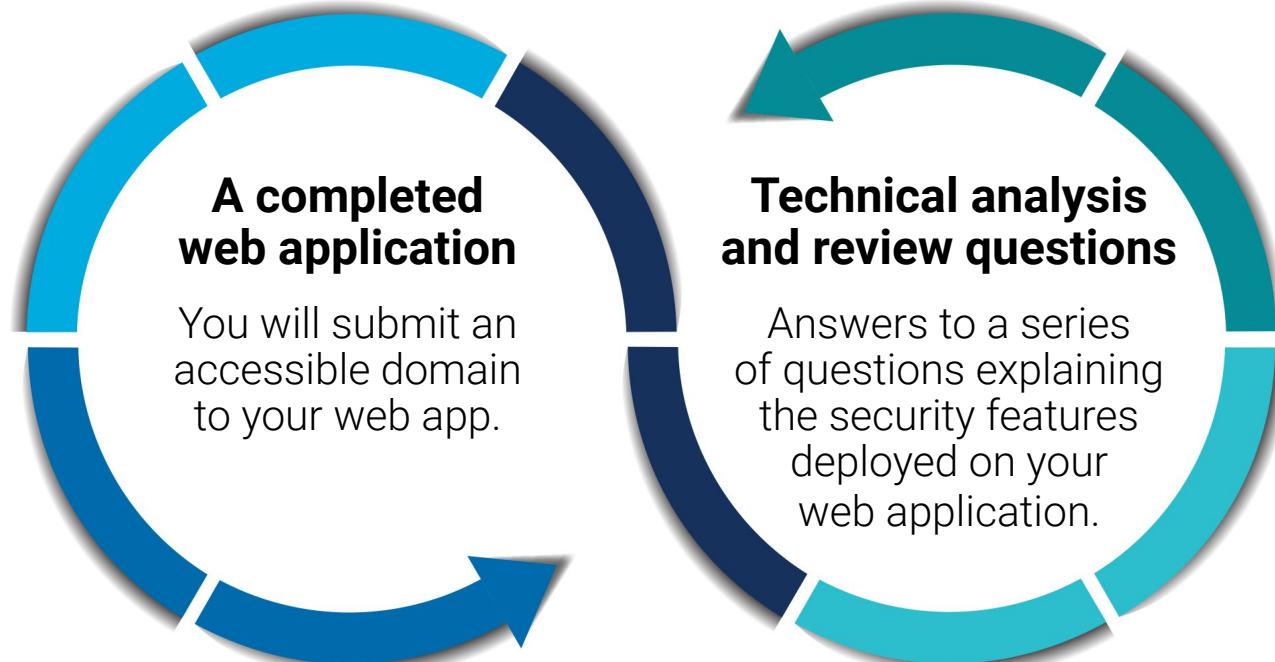
Create SSL certificates and add them to your web application.

03

Install Azure's Front Door WAF, and analyze Azure's security recommendations.

Project Deliverables

The project is due one week from the final day of this project. There is no homework for this week. You will submit the following deliverables:



Today's Class

The rest of today's class will proceed as follows:



Introduction to Azure Web Apps



Overview of tasks that you will complete today



Project work



Introduction to Azure Web Apps

Recall last week...

During the Cloud unit, we used Azure to create multiple virtual machines.

One **jumpbox** to
deploy code on the
other machines



Two or three **VMs** to host Docker
containers of the DVWA web application



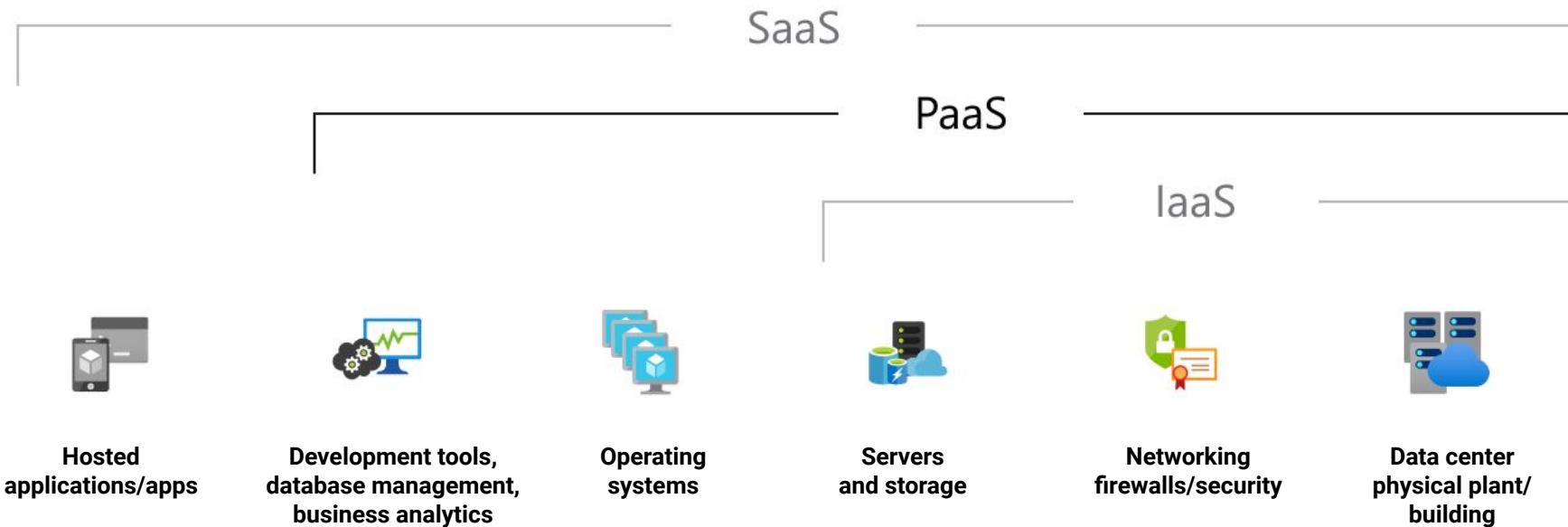
These VMs are considered **infrastructure-as-a-service (IaaS)**, since we used these cloud services to manage the following:

- Operating system (Ubuntu)
- Middleware (software between OS and the applications)
- Applications (DVWA container)

Organizations can also place more responsibility on the cloud provider and only manage the web application. This is known as **platform-as-a-service (PaaS)**.

Azure App Service

Azure has its own PaaS, known as **Azure App Service**. We will use this service to secure our web applications this week.



Azure App Service

Advantages of using Azure App Service over Azure VMs include:

Delegation of responsibility	We can pass responsibility for managing features outside of the web application to the cloud service provider.
Efficiency	Web applications can be deployed much faster, since users don't have to configure their OS.
Maintenance	The user doesn't need to maintain the OS and middleware via software updates and patching.
Cost	Azure app services are cheaper to run than virtual machines.
Features	Azure App Service has built-in features for securing and hosting a web application, such as DNS, web app firewalls, domain purchasing, and SSL certification binding.

Day 1 Overview

Day 1 Project Overview

For the remainder of today's class, we will complete the following:

- 01 Create an Azure web application.
- 02 Choose a domain.
- 03 Deploy a container on the web app.
- 04 Design your custom web application.
- 05 Answer review questions.

Step 1

Create an Azure Web App

The first step is creating an Azure web app resource.

You will receive a guide that provides the steps to complete this.

Use your same subscription and resource group from the Cloud unit.

The screenshot shows a browser window with the Azure website. The top bar has a 'Start free' button. The main content area says 'Develop your next app with your Azure free account' and 'Get started with 12 months of free services'. Below this is another 'Start free' button and a link 'Or buy now >'. The bottom half of the screenshot shows the Microsoft Azure (Preview) dashboard. It features a toolbar with icons for 'Create a resource', 'All resources', 'Virtual machines', 'App Services', 'Storage accounts', 'SQL databases', 'Azure Database for PostgreSQL', 'Azure Cosmos DB', 'Kubernetes services', and 'More services'. A 'Recent resources' table lists the following items:

Name	Type	Last Viewed
arm	API Connection	Just now
BuildApp	App Service	Just now
Ai-Datasource-loc33	Application insights	3 min ago
adventure-vm-3-ip	Public IP address	3 min ago
adventure-vm	Virtual machine	6 min ago

At the bottom, there are links for 'Subscriptions', 'Resource groups', 'All resources', and 'Dashboard'. A 'Chat with Sales' button is located in the bottom right corner.

Step 2

Choose a Domain

After you create your web application, you will be able to assign a unique domain to the website. You will have the option to create a free domain through Azure, or pay a low cost.

Zero-Cost Option

Azure's
Free Domain

\$0.00

Paid Option

GoDaddy
99¢ Domain

.99¢

Zero-Cost Option: Azure's Free Domain



Advantages

- There's zero cost.
- No setup is required; it's automatically provided when Azure web app is created.
- SSL certificate has already been added.



Disadvantages

- The domain will always end with **azurewebsites.net**.
 - **For example:** Bobsresume.azurewebsites.net
- The DNS is not modifiable.
- **There is one limitation to a Day 2 activity.** You will move through the process of creating your own SSL certificates. However, you will only complete a theoretical activity adding the SSL certificate to your website, since you cannot add an SSL certificate to the free website.

Paid Option: GoDaddy .99¢ Domain



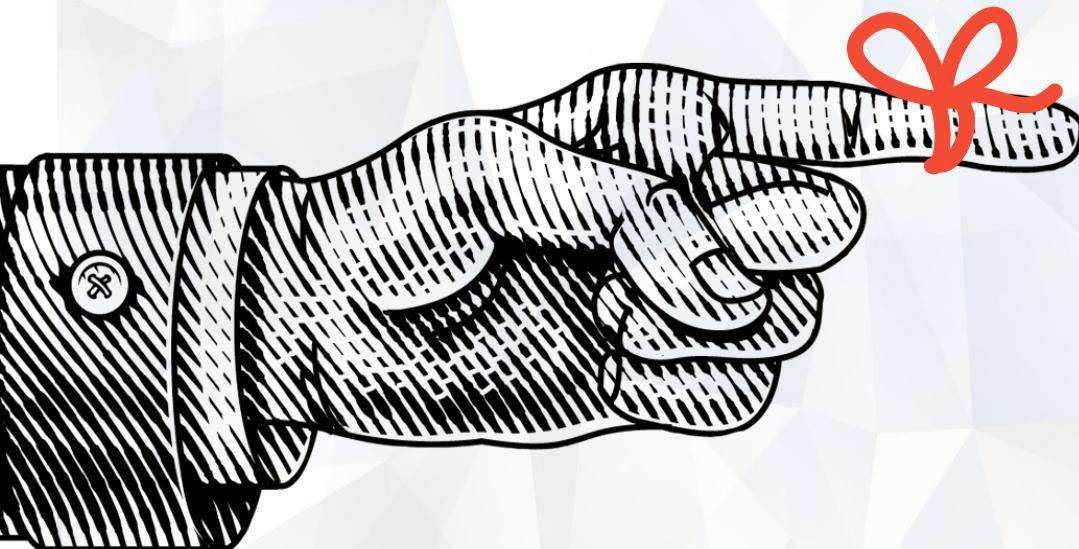
Advantages

- It's low cost, starting at .99¢.
- You can choose your own domain.
- There are no limitations on any activity this week.



Disadvantages

- The domain needs to be created on a third-party website, godaddy.com
- 99¢ domains are usually .info or .website TLDs.
- Additional steps are required to point the DNS from GoDaddy over to Azure (these steps will be provided).



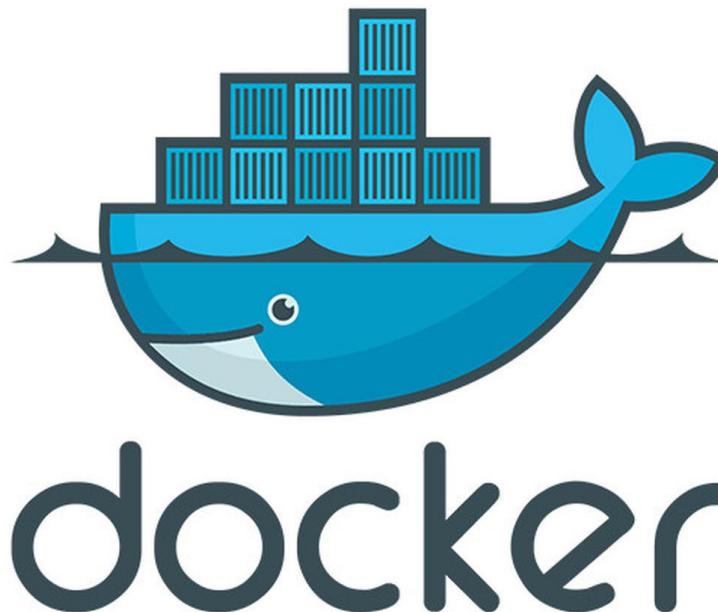
Remember,

You will be responsible for
any incurred expenses for
maintaining your website
after this project.

Step 3

Deploy a Container on the Web App

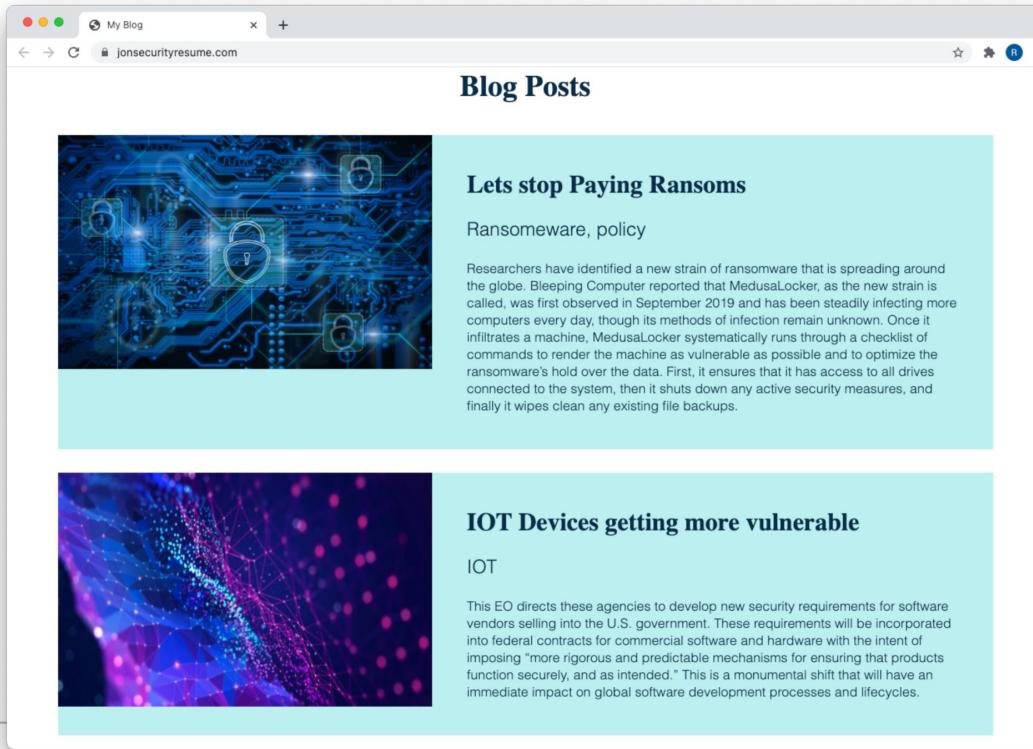
You will be provided instructions for deploying a Docker container that contains a framework of a webpage for your custom web application.



Step 4

Design Your Custom Web Application

You will be provided instructions for customizing your cyber blog web application. You will also research two topics and add posts to your cyber blog.



The screenshot shows a web browser window titled "My Blog" with the URL "jonsecutryresume.com". The page displays two blog posts:

- Lets stop Paying Ransom**
Ransomware, policy
Researchers have identified a new strain of ransomware that is spreading around the globe. Bleeping Computer reported that MedusaLocker, as the new strain is called, was first observed in September 2019 and has been steadily infecting more computers every day, though its methods of infection remain unknown. Once it infiltrates a machine, MedusaLocker systematically runs through a checklist of commands to render the machine as vulnerable as possible and to optimize the ransomware's hold over the data. First, it ensures that it has access to all drives connected to the system, then it shuts down any active security measures, and finally it wipes clean any existing file backups.
- IOT Devices getting more vulnerable**
IOT
This EO directs these agencies to develop new security requirements for software vendors selling into the U.S. government. These requirements will be incorporated into federal contracts for commercial software and hardware with the intent of imposing "more rigorous and predictable mechanisms for ensuring that products function securely, and as intended." This is a monumental shift that will have an immediate impact on global software development processes and lifecycles.

Important

Do not stop or restart your web application in the Azure portal,
as doing so will cause you to lose all updates to your HTML.

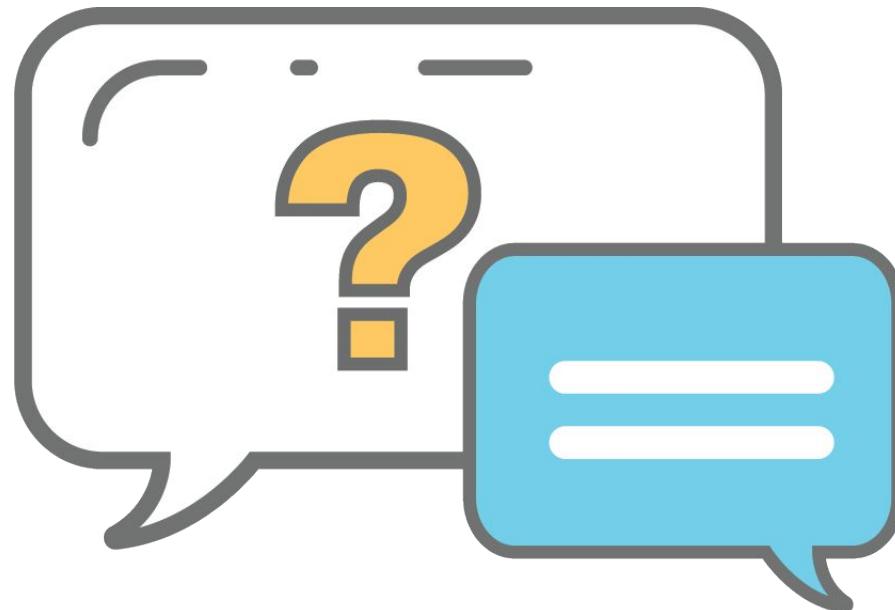
Be sure to follow the instructions to **BACKUP** your HTML file when you
make updates, in case you do lose your HTML updates.

Step 5

Answer Review Questions

Once you complete today's activities, you will answer several questions about the project and how it relates to concepts that we've covered in class.

Feel free to use any resources available (e.g., class notes, slides, online resources) to answer these questions.





Build, Host, and Design Your Own Web Application



Let's Get Started



For the remainder of today's class, you will work on the daily project tasks.

While each student is responsible for completing their own project, you can use classmates, TAs, or the instructor to assist if you have any questions.

The milestones that you need to complete in order to continue to the next day include completing the build, host, and design of your web application.

Make sure to use the appropriate guide for the domain cost that you select (free or paid).



Activity: Build, Host, and Design Your Own Web Application

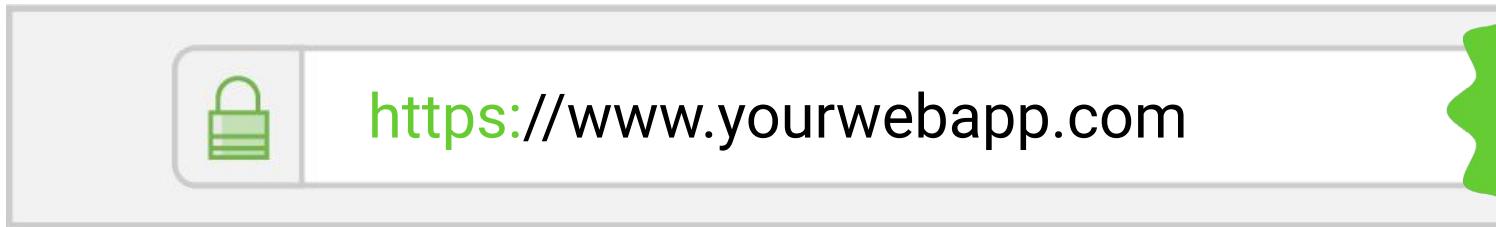
In this activity, you'll work toward completing your project's Day 1 tasks.

Suggested Time:

To end of Class

Project Work Time

Tomorrow, you will secure your web application with SSL certificates.



Questions?



*The
End*