

"A child educated only at school is an uneducated child." – George Santayana

2020 Projects 🕨 Launching Demos Platform

(Deadline: 17th December 2020)

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If you have any questions, issues, or suggessions:

🕥 https://www.stemloyola.org 🛛 🖂 stemloyola@gmail.com



2020 Annual Project Challenge: Website Management

1. Note on the Previously Announced "Networking Challenge"

As previously announced, this year's annual project challenge was about networking. However, due to challenges of making sure that all students will have a common learning platform to implement the challenge, we have postponed it to early 2021. In the meantime, we have been working to build a platform that will ensure that all students participating in future projects will have a common arena to implement and host their projects/demos. The platform is ready and available at https://demos.stemloyola.org. Those who participated in past STEM Programming Challenges will have received private emails with credentials they need to login (via SSH) into the server. If you participated in past challenge and have not received such an email (about 3 of you), email your full names to stemloyola@gmail.com.

2. About the Website Management Challenge

We desire students to learn real-world and practical skills. Since most of the websites are hosted on Unix/Linux operating system (about 67% according to W3Techs's report <u>https://bit.ly/3nqqqds</u>), the Demos platform is built using Linux (CentOS 8 to be precise). As a result, students will need to learn about Linux, the command line and other tools in order to use their Demos accounts effectively. As usual, comprehensive tutorials will be provided. We will assume that students do not have any prior knowledge of Linux. If you are ready to learn and work hard, in no time, you will be doing amazing things.

3. So, What is '2020 Final Project Challenge' Exactly?

This year's final project challenge will be about showcasing one or multiple of your web apps (e.g. websites, games, etc.) that you have created in the past or you can create before the Loyola Day. The challenge will be for you to learn and practice how to login into the server (using SSH), upload/download files to your web account (using FileZilla), and testing that your website works as intended. This will facilitate the Loyola Day and ensure that you learn all the basics of managing a web server. This will be necessary for future projects that will be implemented and hosted on the platform.

4. More Info About the Demos Server

Each eligible student will receive an account that is totally isolated from others. Each student's account will be reachable through a unique URL (e.g. <u>https://demos.stemloyola.org/coder/bmanga</u>)

The account will include:

i. **Ability to host multiple websites** (each website located in its own unique folder). Each student will receive unique credentials to his/her account. Students cannot access or see the source code of other students. To access other students' websites, one needs to use a browser like the rest of public users.

ii. A private database. Each student's account will have a private database that can only be accessed by the websites a student will create. Each student will receive unique credentials that his/her web applications will need to use to access the database. You can access your database portal via <u>https://demos.stemloyola.org/database</u>. Note that the credentials needed to login into the database portal will be different to the one used to SSH into your web server.

Important Note:

i. The contents of each account (from all websites hosted) must be less than 1 GB. The server monitors usage and will block additional of more data after the 1 GB limit has been exceeded. Use "quota -s" command after logging in into your server to track how much space you have already used within your account (e.g. In the figure below, 'fsowani' has used 108 KB of space with the given quota of 1,024 MB). If you exceed the given quota, you will be given a 10-day grace period to remove extra files. Remaining days of a grace period will be indicated under "grace" column. Also, the server will not let you exceed the quota beyond the absolute limit of 1,200 MB. After your grace period is over or if you exceed the absolute limit, the server will not let you add more files and you will not be able to effectively use your account.

[fsowani@demos ~]\$						
[fsowani@demos ~]\$ quota -s						
Disk quotas for user fsowani (ui	d 1001):					
Filesystem space quota	limit	grace	files	quota	limit	grace
/dev/vda1 108K 1024M	1200M		40	Θ	Θ	
[fsowani@demos ~]\$						

ii. Various security measures have been implemented in the platform. As one of measures to prevent brute forcing and DoS attacks, IP addresses that repeatedly try to access the server with wrong credentials (username and/or password) are automatically blocked. For instance, if you try to access the server with wrong credentials 9 times within a timeframe of 10 minutes, your IP address will be blocked for 6 hours.

5. Demos for Loyola Day

Demos to showcase during the Loyola Day should be uploaded by 17th December 2020. *Part A* below has necessary instructions and tools needed to access and upload your website to the Demos platform. Also, *Part B* below has resources for designing and creating websites.

Do not hesitate to reach out to the STEM Team with any questions or clarifications via stemloyola@gmail.com or WhatsApp using the number communicated earlier.

PART A: Resources and Tutorials for Web Server Management

- 1. Logging Into Demo's Server Using SSH
 - a) Using Windows 7/8/10

Use the inbuilt **Windows PowerShell**. Since April 2018, SSH is enabled by default within the PowerShell. Type only "ssh" and press <Enter>. If you get usage instructions (like shown in the image below), then SSH is enabled and you can proceed to login. If you get an error that "The term 'ssh' is not recognized...", then enable it using instructions available at https://bit.ly/38Ji10F

🔁 Windows PowerShell			\times
PS C:\Users\frath> <mark>ssh</mark>			^
usage: ssh [-46AaCfGgKkMNnqsTtVvXxYy] [-B bind_interface] [-b bind_address] [-c cipher_spec] [-D [bind_address:]port] [-E log_file] [-e escape_char] [-F configfile] [-I pkcs11] [-i identity_file] [-J [user@]host[:port]] [-L address] [-1 login_name] [-m mac_spec] [-0 ctl_cmd] [-o option] [-p p [-Q query_option] [-R address] [-S ctl_path] [-W host:port] [-w local tun[:remote tun]] destination [command]	ort]	
PS C:\Users\frath>			

Figure 1: SSH Command Output If Installed and Enabled

Note: Microsoft has released <u>Windows Terminal</u> which is more user friendly and customizable than Windows PowerShell. For instance, <Ctrl + C> and <Ctrl + V> shortcuts to copy and paste respectively work as expected in Windows Terminal. However, the shortcuts do not work in Windows PowerShell. To copy or paste in Windows PowerShell, you need to "Right Click" after selecting the text. Also, clicking inside a PowerShell window will pause it (to enable selecting text). You will need to press any key on the keyboard to activate the window.

You can install Windows Terminal from the Microsoft Store: <u>https://bit.ly/38NrLa5</u>. If you feel nerdy, this video shows why Windows Terminal is better: <u>https://youtu.be/9jQthJ2uvLI</u>.

b) Using Linux (e.g. Ubuntu) or MacOS Setup

Use the inbuilt **Terminal**. SSH will be installed by default. Similarly, if you only type 'ssh' and press <Enter>, you will get usage instructions like in **Figure 1** above.

Note: If you have installed Linux (e.g. Ubuntu), we recommend installing and using Terminator (especially if you multitask a lot). Watch <u>https://youtu.be/_U2Yy5B2ASU</u> to get the feel of why Terminator is better than a normal Terminal.

c) SSH Usage (Linux/Windows/MacOS)

Either in *PowerShell* or *Terminal*, type in the command 'ssh', followed by your username and the server's domain as shown in the **Figure 2** below (server's IP address can also be used but

since that can change, a domain is better and easier to remember). We do not need to specify the port number since the Demos server uses SSH on its default port (Port 22).

For example, to login as 'fsowani', type '**ssh fsowani@demos.stemloyola.org**' without quotes. The first time you login into a server, you will be asked if you want to trust the host. Type '**yes**' and press <Enter> to continue.



Figure 2: Login into Demos Server

Then you will be presented with the server's banner. This is a disclaimer that you should read and understand well. Continuing to user the Demos server means you have accepted and agreed to the terms of the banner. Below the banner, you will be prompted to enter your password. Enter your password and press <Enter>. Note that, when you enter the password, nothing will be shown on the screen (not even asterisks '*').

If everything goes well, you will be granted access into your server. Your username (e.g. 'fsowani' used here) will be shown together with the server's name 'demos'. Also, the current working directory (e.g. '~' or 'public_html' in the figure below) will be shown after the server name. Three commands (ls, cd, and tree have been used below to demonstrate this. Refer to *The Linux Command Line* book for detailed explanation of these commands).



Figure 3: Successful SSH Login

IMPORTANT NOTICE (1): The server implements several security features. If you provide a wrong username or password nine (9) times within 5 minutes, your IP address will be banned to access the server for 6 hours.

IMPORTANT NOTICE (2): Your server has the following default structure:

i. public_html

This is your website's root directory. For instance, for user 'fsowani', visiting https://demos.stemloyola.org/coder/fsowani actually takes the browser to 'public_html' directory. If the user adds a folder inside public_html called "tests" and inside tests folder adds a file called home.html, visiting https://demos.stemloyola.org/coder/fsowani tests folder adds a file called home.html, visiting https://demos.stemloyola.org/coder/fsowani/tests/home.html will display the contents of 'home.html' file. Since anything you put inside public_html can be seen by anyone, only upload files and folders of your website that you intend to be seen by everyone (e.g. JavaScript, CSS, images, HTML files). Files that should be private (e.g. scripts containing database credentials) should be uploaded outside the public_html folder (e.g. inside the 'db' folder or other folders can you create).

ii. cgi-bin

CGI stands for Common Gateway Interface and refers to a set of standards that define how information is exchanged between the web server and a custom script. The server is set up to allow execution of Python-3 and Perl-5 scripts from this location. For instance, a 'test.py' script inside the cgi-bin folder of 'fsowani' user can be referenced as <u>https://demos.stemloyola.org/coder/fsowani/cgi-bin/test.py</u>.

iii. db

This folder contains your database credentials. We recommend placing all scripts (e.g. PHP scripts) that access your database inside this folder. This is simply a recommendation and you can opt to structure your website in other ways.

iv. files

This folder contains a file that keeps a count of how many times the temporary website file has been accessed. This provides an example of how a text file can be used as a backend to store dynamic values instead of a database.

2. Upload/Download Files Into Demo's Server Using FileZilla

Works in all major operating systems (Windows, Linux, MacOS). Download FileZilla from https://filezilla-project.org/download.php. In Ubuntu, you can simply install FileZilla using the command 'sudo apt update && sudo apt install fileZilla -y'

After launching FileZilla, you will be presented with a window similar to Figure **4** below (may change slightly depending on your operating system). The three major sections you will frequently use are described below.

Host:	Username:	Pass	sword:	Port:	Quickconnect -
Local site: /boo	t/	~	Remote site		~
□ 〕 / ■ bin					
Filename 🔨	Filesize Filetype	Last modified	Filename 🔸	Filesize Filetype	Last modified Permis
sefi grub	Directory Directory	01/01/1970 04: 01/12/2017 11:		Not connected to	any server
21 files and 3 dire	ectories. Total size: 175.7	MB	Not connec	ted.	
Server/Local file	Directio Remo	ote file	Size	Priority Status	

Figure 4: FileZilla Client

Section #1: A section where you specify remote server's details (i.e. Demos server) and your credentials:

- Host server's domain or IP address (i.e. 'demos.stemloyola.org' for Demos server).
- Username your login name sent to you individually.
- Password your account password sent to you individually.
- Port network port for SSH. Demos server uses the default SSH port, hence specify '22'.

Then click on "Quickconnect" to login into the server. The first time, you will be asked to confirm if you trust the server's authenticity. Click <Yes> to proceed.

Section #2: This section shows local files (files on your laptop/desktop). The upper section will display only the directories/folders (path). The lower section will display the directories/folders and files available at a location selected in the upper part of *Section #2*.

Section #3: This section shows remote files (files on the Demos server). The section is similar in structure to *Section #2* above. Use the upper part of *Section #3* to navigate to a specific location (e.g. public_html). Use the lower section to see the files and sub-directories/folders contained in the selected location.

Copying files between your local machine and the remote server, will simply involve dragging and dropping the file/directory. To download from a server to your local machine, drag the file/directory from the lower part of *Section #3* to the lower part of *Section #2*. Dragging from *Section #2* to *Section #3* will upload the file/directory. Also, double-clicking a file in *Section #3* will

cause the file to be downloaded. Similarly, double-clicking a file in *Section #2* will result in the file being uploaded.

3. Beginner's Guide to Linux and Command Line

To ensure competency in managing your server and learning programming in general, knowledge of Linux is mandatory. We will use the **"The Linux Command Line (5th Edition)"** book provided for free by William Shotts from **linuxcommand.org**. The latest version of the book can be downloaded from <u>https://linuxcommand.org/tlcl.php</u>. Reading Chapters 1 to 5 and Chapter 9 are mandatory for managing your server well.

To supplement the book, the following tutorials are also recommended:

- Linux Command Line Tutorial for Beginners <u>https://www.youtube.com/playlist?list=PLS1QulWo1RIb9WVQGJ_vh-RQusbZgO_As</u>
- Learning the Linux File System <u>https://youtu.be/HIXzJ3Rz9po</u>

PART B: Resources and Tutorials for Web Apps Development

- 4. Visual Studio Code (Recommended IDE)
 - d) Official Download

Download from: <u>https://code.visualstudio.com/?wt.mc_id=vscom_downloads</u>

VS Code can be configured to run all the programming languages used for STEM Loyola (e.g. C, C++, Java, Python). You will need to ensure that proper compilers/interpreters are installed

e) Live Server Extension – *code like a pro*

Link: <u>https://youtu.be/pKsvDf-sJQE</u>

This Visual Studio Code extension will enable you to automatically see the changes you are making to your website in the web browser soon after you save your ".html", ".css", or '.js" file, without a need to refresh the browser page.

Also, if you have a strong computer/laptop, you can enable automatic saving (<u>https://youtu.be/y4qqQeUDCBQ</u>). You can set a delay of, say 2 seconds), and 2 seconds after you stop typing, Visual Studio Code will automatically save all your source code files and refresh the browser.

5. HTML and CSS

HTML Crash Course for Absolute Beginners: <u>https://youtu.be/UB1O30fR-EE</u>

CSS Crash Course for Absolute Beginners: <u>https://youtu.be/yfoY53QXEnl</u>

HTML Cheat Sheet: <u>https://challenges.stemloyola.org/assets/references/html-css/The-Complete-HTML-Cheat-Sheet.pdf</u>

6. JavaScript

JavaScript Tutorial for Beginners: https://youtu.be/W6NZfCO5SIk

JavaScript Cheat Sheet: <u>https://challenges.stemloyola.org/assets/references/javascript/JavaScript-Cheat-Sheet.pdf</u>

7. Bootstrap HTML, CSS, and JavaScript Library v4

a) Official Reference

Bootstrap is the most popular HTML, CSS, and JavaScript library that enables building fast and responsive websites.

Official Documentation: https://getbootstrap.com/docs/4.5/getting-started/introduction

b) Bootstrap 4 Tutorial

Start with video #2 because video #1 was relevant before the official version 4 was not released. <u>https://www.youtube.com/playlist?list=PLRtjMdoYXLf47brThg9-nTj8HSq8cQ0ND</u>