

Configuring and Customizing the Hubzero Experience

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Abstract—HUBzero is an open source software package used to construct websites for scientific research and educational activities. HUBzero was originally created by researchers at Purdue University in conjunction with the National Science Foundation (NSF) who sponsored the Network for Computational Nanotechnology to support nanoHUB.org. The HUBzero platform currently supports over 40 hubs across a variety of disciplines, including cancer research, biofuels, climate modeling, water quality, education, and more.

The team investigated how HUBzero features are utilized for research, education, and scientific collaboration. The project involved configuring and customizing the user experience on a new hub. The team also learned how to work with simulation workspaces, plus the process of allowing groups to collaborate. Finally, the team learned how to publish the hub so that it could be viewed publicly and how to use the new database component.

To accomplish this, the HUBzero team members used data collected by the 2013 Research Experience for Undergraduates Pasquotank River Watershed Team who completed tests of five tributaries and the river itself. Streams tested were Newbegun Creek, Knobbs Creek, Areneuse Creek, Mill Dam Creek, and Sawyers Creek. The team uploaded test data to a database to determine how HUBzero handles databases.

Keywords—HUBzero, gateway user experience

I. INTRODUCTION

In order to make recent research data collected by participants of the Center of Excellence in Remote Sensing (CERSER) program at Elizabeth City State University (ECSU) interactive for other users of the science community, HUBzero was introduced as a tool for fulfilling the task at hand. In order for the HUBzero tool to be of assistance, the proceeding questions are to be answered: How can the team obtain knowledge of HUBzero by creating a hub; What processes are required to upload a database to the hub and further install it on a computer server; How can the hub be made accessible and interactive to the science community.

Prior to making research data interactive and accessible, a hub must be created using HUBzero to set the stage for community interaction. HUBzero was created with the purpose

of sharing and connecting theorists, experimentalists, and educators all with the collective aim of bridging together scientific discovery and the scientific community. With this in mind, by creating a hub, customizing, and establishing it on the HUBzero site through running the VMware player the hub is ready to be manipulated for interaction.

Following the creation of the hub, the team's mission was to create a database of water quality data, previously researched by past CERSER participants, upload the database onto the hub as a component, and make it interactive for others. By adding the database component to the customized hub, not only does this share research data, but it also becomes a piece of the science community for viewers who are exposed to the team's hub.

II. PURPOSE

The team's purpose was to investigate how HUBzero features are utilized for research, education, and scientific collaboration. The project has involved configuring and customizing the user experience on a new hub. The team has also learned how to work with the feature projects, which allow groups to collaborate. Finally, the team will learn how to publish the hub so that it can be viewed publicly and how to use the new database component.

A significant amount of research related previous participants in CERSER at Elizabeth City State University have collected data. Without the presence of an online database that collects this research related data and makes it available, plus viewable for other users, the science community lacks interactivity and connection. Consequently, this aspect can be avoided if an online community database were existent. HUBzero serves as a community in bridging together scientific research and providing opportunity for collaboration amongst researchers. Hence, the aim of the research was to acquire knowledge pertaining to HUBzero by creating a hub on the HUBzero software. Furthermore, the purpose consisted of installing the hub on a computer server, forging a database component of water quality research data, and uploading it to the hub so that the data could be accessed as well as connect the science community.

III. METHODOLOGY

A. Creating a Hub

The research team began by determining the process of how to create a hub using HUBzero on a PC. Prior to establishing a hub, it was necessary to download VMware version 5.5 for Windows 7, a virtual machine, from the VMware website in order for the hub to be able to run [Figure 2]. A 64-bit VM zip file was downloaded from the HUBzero website to the computer and the installation setup process of VMware commenced by playing the HUBzero image in the VMware player [Figure 1].

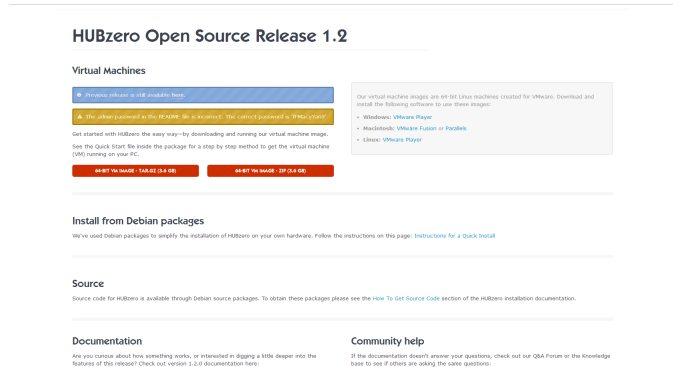


Fig. 1. 64-bit VM Image, Admin password

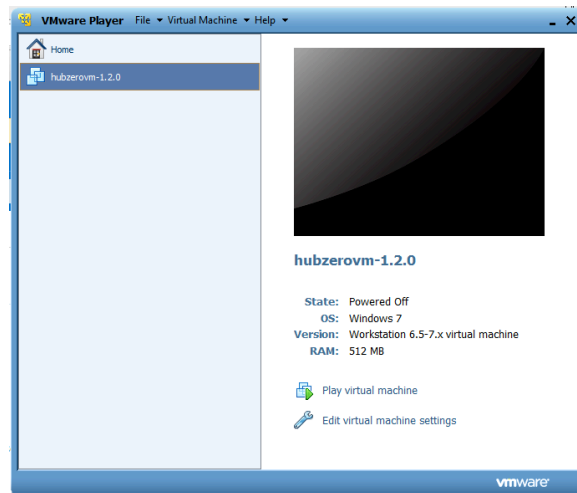


Fig. 2. VMware, virtual machine, version 5.5

In order to avoid network problems, host-only mode was chosen to make the VMware player private and only sharable with the host. Once the player was running, the following step was to set up the IP address for the hub. After logging in with the admin username and password found on HUBzero's website, vi controls were used to navigate and change information inside the VMware player [Figure 3].

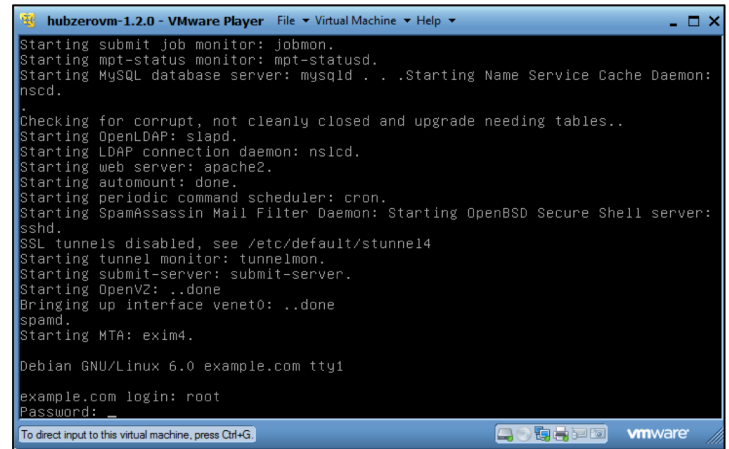


Fig. 3. CERSERhub login process inside VMware player

To find out what the IP address was, that pertained to CERSERhub, ifconfig eth0 was used and typed into VMware player. As a result, the IP address was promptly displayed. Then the team went to the host part of the player and changed the standard IP address to the team's IP address, provided by the player as well. After this task was completed, the virtual machine was restarted in order to ensure the IP address had changed successfully. Next, the IP address was typed into Google Chrome and the team registered as a new user on HUBzero. Precise instructions involving the process of starting a hub were found on the HUBzero website.

B. Establishing the Hub and Customizing

Once the hub was established and made accessible, the team IP address was used for testing purposes [Figure 5]. When the hub was accessed, a user account was made and verified. Next, the team logged into the admin account (the administrator maintenance side of the hub) with the admin password, located on the HUBzero website [Figure 1]. Once complete, the team logged as administrator, with the login `http://Hubaddress/administrator`. Afterwards, the team located the team members' component of the hub and verified the login, so that all team members would have access to the administrative side of the hub. Following that course of action, the team logged in as admin in the user management (the list of hub users) component of the hub to save permission options for users. When the admin profile was set up, the team went to the site to change the name of the hub under the global configuration component [Figure 4]. In the global configuration component further changes to the interface of the website were changed in the assortment templates slate. In Figure 6, the dashboard component keeps track of the projects, tools, groups, and messages that the team is involved in.

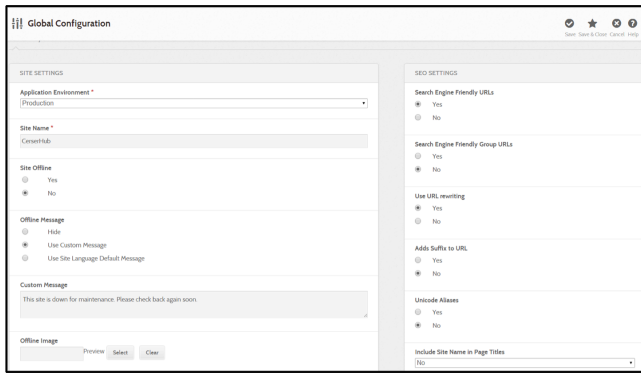


Fig. 4. Global Configuration

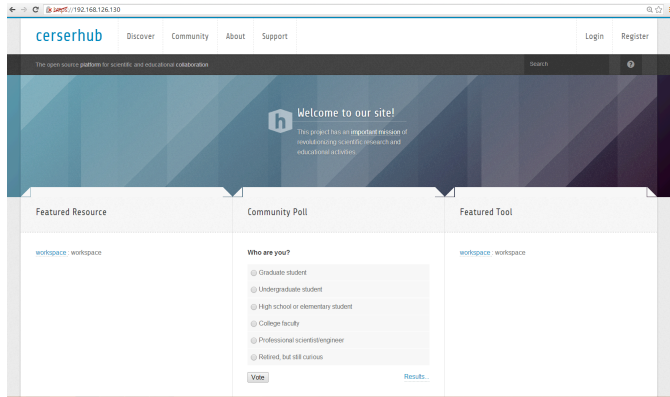


Fig. 5. Homepage of CERSERhub

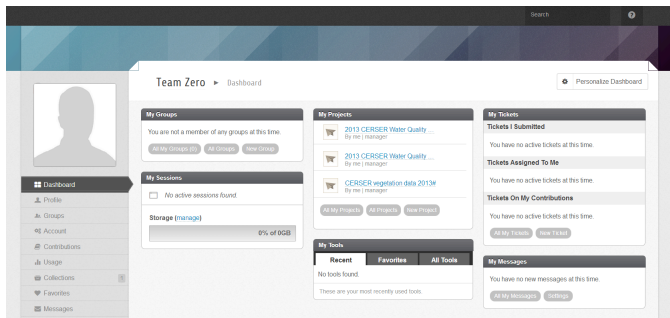


Fig. 6. Dashboard

Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract.

C. Installing Hub on the Server

The team installed VMware ESXi on a Dell computer to make the computer a server for the hub. After the software was installed, the software had to be configured as seen in Figure 7. The same standard username that was found on the HUBzero website was utilized also. Next after clicking the configure management network option, the team continued and changed the current IP address to the IP address of CERSERhub.

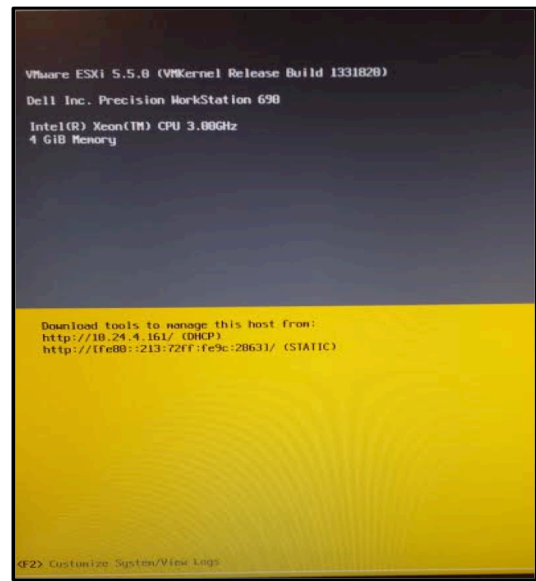


Fig. 7. Attempt of installing VMware ESXi on computer server

2013 CERSER Water Quality Data Trip#1 [waterqualitydata1] Project manager

Databases * Create a database

Step 2: Verify Data [Total number of records: 78 | Displaying 20 records] Back Next

Name of Water Source	Column-1	Column-2	Date	Point	Time	Latitude	Longitude	G.Latitude	G.Longitude	Dissolved Org
Avenue Creek			6/14/2013	A1	10:58			36.3005	-76.115472	
Avenue Creek			6/14/2013	A2	10:46			36.296222	-76.117972	
Mill Dam Creek			6/14/2013	M1	9:12			36.30395	-76.130861	
Mill Dam Creek			6/14/2013	M2	9:28			36.30525	-76.130167	
Mill Dam Creek			6/14/2013	M3	9:42			36.300944	-76.1319	
Mill Dam Creek			6/14/2013	M4	9:36			36.296389	-76.134	
Newbegin Creek			6/19/2013	N1	15:15			36.213139	-76.172861	
Newbegin Creek			6/19/2013	N2	15:05			36.210944	-76.174139	

Showing 1 to 10 of 20 entries

Fig. 8. CERSERhub sample database

The information used to generate the database derived from previous CERSER participant research data of the Water Quality Data from the Pasquotank River data was taken in 2011 and 2013 [Figure 8]. All of the information was created in a Microsoft Excel spreadsheet and was saved as a csv file in order to be compatible with the database component of the hub. In order to initiate this, the team logged into the user account of the hub, created a new project, and added a title. In project settings, the users that the team wanted to have access to the project were selected. The csv file that was created in Microsoft Excel was then uploaded into the hub and converted to a database.

IV. RESULTS

The team was successful in understanding HUBzero and its many functions. Moreover, the team successfully created and named a hub, created a group and administrator login, created a user account, and uploaded the database into the CERSERhub.

An issue that the team faced was that the database component of the hub always manipulated the data from the created spreadsheet. For instance, time data types and special characters were eliminated or altered through use of the

database component. However, despite the circumstances the team did manage to resolve this problem. The team found that LibreOffice, an open source form of Microsoft Office Suite, could be used as an alternate means of creating the water quality data spreadsheet. Additionally, saving the file in UTF-8 format enabled data that possessed special characters to be saved to a spreadsheet as a csv file. In addition, another obstacle that the team incurred was that the database component of the hub would not install the full spreadsheet into the hub so that all the data could be viewed.

The team was not able to successfully install the CERSERhub onto the computer server. When trying to change the IP address to the address that was used to create the hub, the team ran into failure of the default gateway [Figure 8]. Default gateway is what occurs when an IP address does not match any of the routers in the routing table.

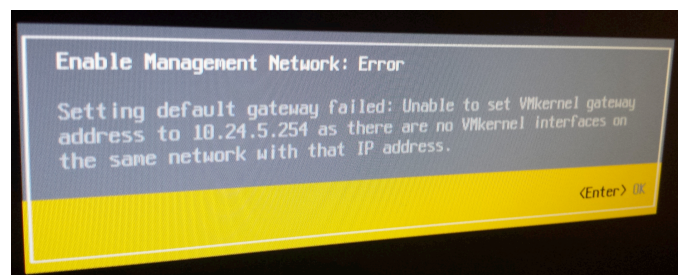


Fig. 9. Default gateway failed

V. FUTURE WORK

Due to time constraints, the team was not able to install the CERSERhub on a server successfully or make the water quality database component interactive. The team contacted Mrs. Ann Christine from Purdue University who has experience with DataStores, an interactive database, on NEEShub. Mrs. Christine gave the team an in-depth tutorial on how to use DataStores and all of its components. Also, Mrs. Christine informed the team that once the CERSERhub was up and running the team could contact her and she would demonstrate how to install DataStores on the CERSERhub. Accordingly, this aspect would enable the team to use the DataStores feature on the CERSERhub. In the future, the team would like to add DataStores onto the CERSERhub to meet the goal of making the database interactive. The team would also like to install the hub on a computer server and make it accessible to more than one computer, thus bridging together the science community and making the hub public. Lastly, the team would enjoy further customizing the CERSERhub so that it is user-friendlier and visually appealing to those whom encounter it.

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