**CSCI363: Cloud Computing & Networking – Cloud Management System**

**User Manual**

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Welcome to our Cloud Management System!

In this document we will provide instructions on how to use our program effectively.

**Prerequisites for running our program:**

* Python Environment: Ensure that Python is installed on the system.
* CustomTkinter Library: Install the `customtkinter` library using the following command:

pip install customtkinter

* QEMU: QEMU must be installed on the machine. The script assumes QEMU is available in the system's PATH.
* Docker: Docker must be installed and running on the machine.
* CTkMessagebox: Install the ` CTkMessagebox ` library using the following command:

pip install CTkMessagebox

* Ubuntu ISO file: Ensure that the ‘ubuntu-22.04.3-desktop-amd64.iso’ file is installed in the same folder as the codes. Which can be downloaded from this link <https://ubuntu.com/download/desktop>

**Getting Started:**

1. Download all code files in the same folder

2. Install all the required packages

3. Run the ‘MainPage.py’ file

First up is the main page of the Cloud Management System application which offers users the option to perform Virtual Machine (VM) operations and Docker operations and utilizes the CustomTkinkter package from python as a graphical user interface (GUI) for our program.

Upon running it, the user will be presented with the main page which offers the two options:

* Create a VM: Open the Virtual Machine operations page.
* Docker Operations: Open the Docker operations page.

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**Option 1: Create a VM**

1. Click the "Create a VM" button to open the Virtual Machine operations page.

2. Follow the instructions on the VM operations page to create and manage Virtual Machines.

**Option 2: Docker Operations**

1. Click the "Docker Operations" button to open the Docker operations page.

2. Follow the instructions in the Docker operations page to perform various Docker-related tasks.

Next up if the user chooses option one which is to Create a VM, then a new menu will show up where the user chooses whether to manually specify the VM configurations or upload a configuration file in batch format.

- Back to Main: Return to the main menu.

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- Enter VM Specifications Manually: Manually input specifications such as disk size, memory size, and VM name.

If chosen, then the user will fill the following:

1. Disk Image Size: Enter the desired disk image size (e.g., '10G', '5M').

2. Memory Size: Specify the memory size for the VM (e.g., '2G', '2M').

3. VM Name: Provide a unique name for the VM using alphanumeric characters, underscores, and hyphens

4. Click the "Create VM" button to create and run the VM with the specified configurations.

5. To return to the VM menu, click the "Back" button.

Success Message:

* If the VM creation is successful, a message box will appear with the title "Success" and the message "Virtual Machine created successfully."

Note:

* The function ensures that input formats are valid and provides error messages if any validation fails.
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  Description automatically generatedQEMU commands are executed to create the VM with the specified parameters.

- Upload VM Configuration File: Provide the path to a batch configuration file for automated VM creation.

If chosen, then the user will fill the following:

1. Batch File Path: Enter the path to the batch configuration file, including the file name and extension (e.g., '.bat'). The batch file should contain valid configurations, and the disk image size limit is 20G.

2. Click the "Create VM" button to read and execute the batch file for automated VM creation.

3. To return to the VM menu, click the "Back" button.

Success Message:

* If the VM creation is successful, a message box will appear with the title "Success" and the message "Virtual Machine created successfully."

Note:

* Ensure that the batch file contains valid configurations and commands for VM creation.
* The function validates the input file path, checks for the existence of the file and its extension, and ensures it is a valid batch file.
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  Description automatically generatedThe Start-Process PowerShell command is used to run the batch file in a new window.

But if the user chooses option two, which is Docker Operations, then the user will be presented with a new main menu containing several options.

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- Create Dockerfile: Allows the user to create a Dockerfile by specifying the path to save it and its contents.

- Build Docker Image: Guides the user through building a Docker image by providing the path to the Dockerfile and the image name/tag.

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Description automatically generated- List Docker Images: Displays a list of Docker images on the user local machine. Note: In case of failure to list Docker images, an error message will be displayed, providing information about the encountered issue.

- List Running Containers: Shows a list of currently running Docker containers. Note: If the listing process fails, an error message will be displayed, including details about the encountered problem.

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- Stop Docker Container: Lets the user stop a specific Docker container by providing its name.

- Search Docker Image: Enables the user to search for a Docker image by name or tag.

- DockerHub Operations: Provides functionality to search and pull Docker images from DockerHub.

- Back to Main: Returns to the main menu if the user navigates to a sub-menu.

**Sub-Menus**

Some options on this menu will lead to sub-menus for more specific operations. Here are the guidelines for using each sub-menu:

* Create Dockerfile

1. Enter the path to save the Dockerfile with the ‘\Dockerfile’ at the end.

2. Input the contents of the Dockerfile, it cannot be empty.

3. Click "Write Dockerfile" to save the Dockerfile.

Note: For any issues or errors during execution, appropriate error messages will be displayed to guide the user.

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* Build Docker Image

1. Enter the path to the Dockerfile, Ensure the specified path to the Dockerfile exists.

2. Provide the valid image name and tag.

3. Click "Build Image" to build the Docker image.

Note: For any issues or errors during execution, appropriate error messages will be displayed to guide the user. The build logs will also be printed for additional information about the Docker image building process.

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* Stop Docker Container

1. Enter the name of the Docker container to stop, avoid using spaces in the image name as it is considered invalid input, and ensure correct spelling and case sensitivity for accurate search results.

2. Click "Stop Container" to stop the specified container.

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* Search Docker Image

1. Enter the Docker image name or tag to search for, avoid using spaces in the image name as it is considered invalid input, and ensure correct spelling and case sensitivity for accurate search results.

2. Click "Search" to find matching images.

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* DockerHub Operations

1. Enter a search term to find Docker images on DockerHub.

2. Click "Search Image" to display search results. Note: If no results are found, an informative message will be displayed.

3. Select an image from the list.

4. Provide a tag for the image.

5. Click "Pull Selected Image" to pull the Docker image. Note: The script will attempt to pull the selected image from DockerHub, and the result will be displayed in a message box.

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**Important Notes**

- Navigation: Use the provided buttons to navigate between different sections of the Cloud Management System.

- Cloud System Icon: The application window features a cloud system icon.

- QEMU and Docker: Ensure that QEMU and Docker are installed on the system for VM and Docker operations, respectively.

- Resizing Window: The application window is resizable for user convenience.

- Disk Size and Memory Format: Ensure that valid formats for disk size and memory size are used (e.g., '10G', '5M').

- VM Name Format: VM names should only include alphanumeric characters, underscores, and hyphens.

- Batch File Format: When uploading a batch file, ensure it has a valid '.bat' extension.

- Path Validity: Double-check the paths provided for batch files to ensure they are valid and exist.

- QEMU Availability: The script assumes that QEMU is installed and available in the system's PATH.

- Container and Image Names: Ensure that the precise names for containers and images are used. Avoid using spaces as they are considered invalid input.

- Path Validity: Double-check the paths provided to save Dockerfiles or specify Dockerfile locations. Paths must be valid, and the specified directory should exist.

- Tagging Images: When tagging images, make sure to provide a valid tag, follow correct spelling, and case sensitivity.