

Requirements Specification

Captain CyBeard: Neil Before Us

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Revision History

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1 Introduction

This requirements specification document will go over the requirements for the Virtual Machine file Downloader for Cypherpath's Resiliency Platform [2] that was outlined in the **Project Plan** [1]. This *Downloader* application will allow users to transfer files directly from various cloud platforms into the Resiliency Platform created by Cypherpath that gives their customers cyber resiliency. The document will cover how the application will provide a solution for users to easily upload their Virtual Machine files to the Resiliency Platform. Along with covering the solution, the requirements specification will also provide details on how users will interact with the application through a web interface. This document will be understood and agreed upon by both the customer (Cypherpath) and the software development team (Captain CyBeard).

Subsequent sections will include background information on Cypherpath and their Resiliency Platform, followed by a high level overview of the application. After this, the document will get into the details of the application such as the environment the application will execute in, and how the application will be operated by users and web administrators.

The Cypherpath Resiliency Platform tool is a product that provides their customers the ability to upload pre-existing virtual machines, network configurations and more, into a self-contained digital environment. This enables their customers to quickly recover from events such as ransomware attacks or human errors. Right now, customers have to manually download their virtual disk images from the various cloud platforms they are hosted on, and then upload those to the Resiliency Platform. Cypherpath would like to have a web application that will enable users to have their virtual disk images go directly from the cloud platform into the Resiliency Platform, cutting out the multi-step process of downloading and then uploading large virtual disk images.

2 Background

Cypherpath's Resiliency Platform started out as a platform where the U.S. Military could emulate the networks of countries and simulate cyber attacks between the countries in order to learn about the strength and weaknesses of the countries simulated. After proving its usefulness in this market, Cypherpath entered the commercial market and provides its platform as a service to companies and local governments alike to provide resiliency to these entity's network infrastructures. Resiliency in the cyber sense means that systems and networks are secure, recoverable and continuous. Customers of Cypherpath enjoy a readiness of their technological resources, and can rapidly adjust and adapt those resources when failures, damages or attacks occur in order to keep their business running

smoothly.

This project will become a component of the Resiliency Platform by enabling Cypherpath's customers to more easily migrate their virtual assets into the platform. Currently customers have to download their virtual assets onto their local machine and then upload them into the Resiliency Platform. This project will simplify this process by having the Resiliency Platform download the virtual asset directly into its infrastructure. The software development team will not be integrating the application with the Resiliency Platform. The product delivered to Cypherpath will be a standalone web application that downloads digital assets from various cloud platforms. Upon completion of the project, Cypherpath will integrate the web application into their Resiliency Platform by changing the user interface and theme of the application to match theirs. They only need the backend Python-Django part of the application.

3 Overview

The purpose of this application is to allow users to download virtual disk images from online cloud platforms, to the Resiliency Platform (the application delivered will only download the files to local storage). The application itself will operate as a web server using Python3 [5] and Django2 [6]. Users will start the application by navigating to the URL pointing to the application. Once at the main page the user will provide a URL to their account on an external cloud platform. Once the application processes the URL to determine which cloud platform the URL points to, the user is then asked to provide their credentials to authenticate to that platform. After authentication, the application will use the API of the cloud platform and show the user their Virtual Disk Image (vdi) for that machine. The user will be able to navigate their directory structure and select which files and folders to load into the platform (again, during development the application will download the files to local storage instead of interacting with the Resiliency Platform).

The application will be written with Python3 and Django2, including the requests libraries for API calls, Authentication libraries like SAML and standard libraries. To install the application, Cypherpath will integrate the Django web application into their environment along with installing (if not installed already) the libraries for interacting with the external cloud platforms and authentication API's. Users of the application will not need to install any software since most operating systems come with a web browser which will interact with the application on the user's end.

4 Environment

This section will describe the environment the application will reside in. This will include the web application, authentication API's, cloud storage API's and the local storage of the machine running the application. During development this will be the users machine, but Cypherpath will be using their storage scheme for production.

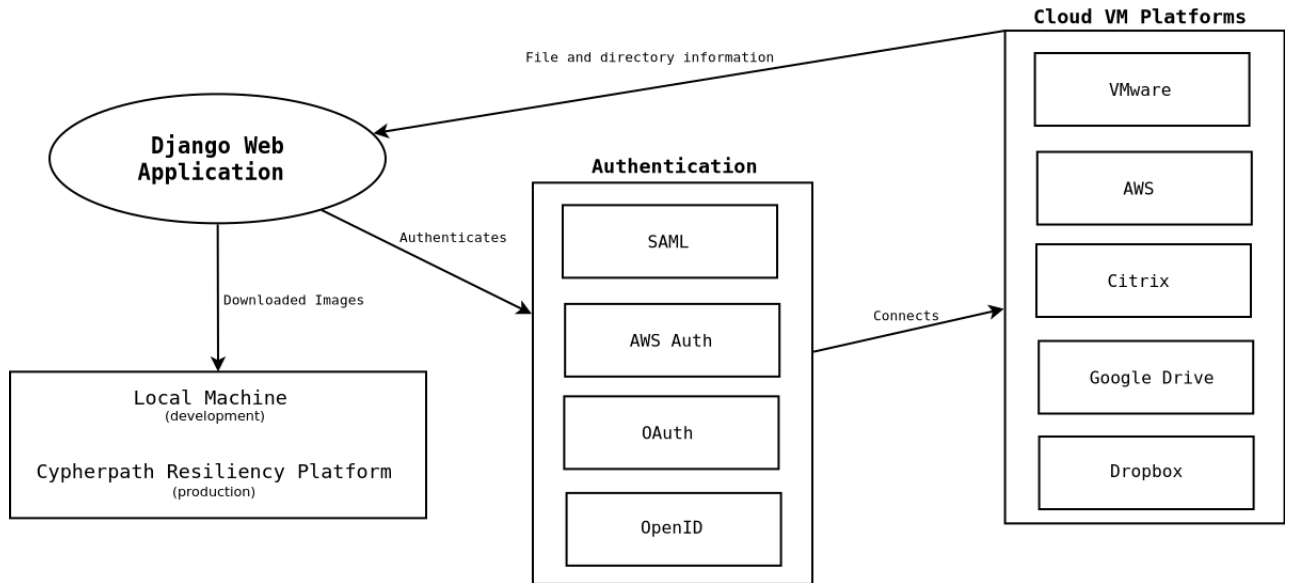


Figure 1: A visual representation of the applications environment.

4.1 Web Application

The web server for the application during development will be Django's built in development server and when the project is completed, Cypherpath will integrate the web application into their existing ecosystem using their webserver. The Django application will host the functionality of the application, including HTML templates for the web pages, where users provide Virtual Machine URLs and browse their directories. Additionally, the Django framework will allow the usage of python classes that will enable the back-end operation of the application.

4.2 Authentication API's

The application will authenticate to the cloud platforms with various authentication methods and API's. The application will support SAML, AWS Authentication, OpenID and OAuth.

The application will be designed in a modular fashion so that more authentication methods can be easily added later. The authentication will provide a token to verify the users for their cloud platform. The application will not provide previous states for the use of the website, nor will it save previous URL's entered. The token will be passed to the request for access to the URL provided.

4.3 Cloud Storage API's

Once the application is authenticated to a cloud storage platform it will gather the directory structure for showing to the user and allowing them to select which of their files they would like to download. The application will support interacting with VMware [4], Amazon Web Services [3], Citrix, Google Drive and Dropbox. The API's that are necessary for the communication, will request the directory structure of their cloud storage and provide it to the user so they can select which virtual disk images, from the cloud platform, they would like to download. Like the authentication modules, the modules for interacting with the cloud API's will need to be designed so that adding support for other cloud platforms will be possible.

4.4 Local Storage

Once the user has selected which files to download from their cloud platform, the application will download those files to the user's local storage. The application will download all of the user's selected files from the cloud platform to their local storage. The local storage location will be determined by the web browser, the application will serve the files from the cloud platform to the user's web browser. Nothing else needs to be done with the files because after the application is finished and Cypherpath has integrated the web application into their platform, they will direct the downloads where they need them.

5 Operation

In the following sections the operation of the application will be described, including starting the application (invocation) from the user's perspective and the web server administrator, the commands the application uses and finally, how users and administrators will terminate the application.

5.1 Invocation

During development the application will be started using Django's built-in webserver and the user will not need to be authenticated to use the application. To invoke the application the user will simply enter the URL for the application (such as `http://localhost:8080`). They will then be presented with the main screen of the application. The screen will have a single input text box for a user to insert a URL. Additionally a submit button will be provided for them to continue to step through the application.

To start the development server, the developer/mock web administrator will use the following command in the Django project directory containing the *manage.py* file.

```
$ python manage.py runserver
```

The user will now be able to use their web browser to visit the main page.

The user interface and invocation of the application are simple. Later when Cypherpath integrates the application into their Resiliency Platform, invocation by the user will be from within Cypherpath's platform. Cypherpath does not have preferences on the user interface since they will be adding their own style, layout, themes, etc. to the user interface. The server side of the application will be invoked from Cypherpath's web server that serves their platform.

5.2 User Actions

This section covers how the user will interact with the application and how entering the application, displaying the file structure, downloading virtual disk images and error catching will be implemented.

5.2.1 Enter URL

On the main page of the application the user will be presented with a textbox where they will enter a URL that goes to their cloud platform. The text box will be centrally located with a design to help users clearly see where to input the URL. The box will also have shadow text requesting input. Once a URL is entered and submitted the application will figure out which cloud platform the URL belongs to, through a GET request to the URL. If an error occurs with the GET request the user will be notified of the error. If the request is successful then the user will be prompted to provide their

login credentials to their cloud platform, on a pop-up window. The authentication will be verified with the platform they are using, (for example: SAML for VMware or AWS Auth for AWS). Once authenticated the application will present the user with their files and folders that are on that platform.

5.2.2 Display File Structure and Download Selected Files

Once the user has selected a cloud platform and is authenticated, they will be presented with their directory structure on that platform. They will only see high level directories initially, however, they will be able to open the directories to see files located within. They can use this information to verify all files were retrieved from the cloud once downloaded and select which files to download. After selecting the files and folders the user wants, they will click the download button, which initiates the download of their selected files from the cloud platform. Unless specified differently in their browser preferences, the user can expect to find copies of the files in their home download folder. When Cypherpath assimilates the application into their platform they will direct the download where they need it. This will be accomplished by Cypherpath changing the actions of the download button to do what they need the button to do instead of doing a simple GET request to download the materials.

This page that presents the user with their directory structure will also contain a back button, in addition to the download button that allows them to visit the main page and enter a URL to a different cloud platform.

5.2.3 Error Catching

Errors will be detected through the various aspects of the program. If the users provides an invalid URL or the URL cannot be located, an error message will be displayed and they will be presented with the text box to enter a URL again. If the user does not provide valid credentials to the external cloud platform they will be prompted to re-enter their credentials. The application will not enforce a limit on the number of authentication attempts the user can make, however the external authentication API or the cloud platform may have limits that it will enforce. Additionally if the download fails and the web browser's download manager is unable to recover or restart the download then the user will have to press the download button again assuming they haven't left the page.

Additionally, the application may not be able to tell what platform the URL points to, in this case the user will be prompted to select from a list of supported platforms which one the URL goes to.

5.3 Termination

Since the user is not authenticated to the web application, to terminate their interaction with the application they will simply close the browser tab or window that has the application open. Use of the authentication token will be deleted as well per use, there will be no cookies to remember users every time they log into the accounts. After termination of the application the user will have to go through the same steps when they invoke the application since sessions and states are not remembered by the application.

During development the Django Web Server that is used will be terminated by the developer entering *ctrl + c* on their keyboard to end the process. Once Cypherpath has integrated the application into their ecosystem they will terminate the web application their way.

6 Priority of Cloud Platforms

Cypherpath has expressed that VMware vSphere and Amazon Web Services cloud platforms are the priority to have supported with the application. After those modules are working, Captain Cybeard will then add support for Citrix, Google Drive and Dropbox in that order of priority. The requirement is that at least VMware vSphere and Amazon Web Services be supported.

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