SCHYNDEL WORKS™ WEBSITE PROJECT

April 27, 2017

OVERVIEW

1. Project Background and Description

As the 2017 technology placements have been completed, SchyndelWorks now has a team of technology graduates that can help them setup their public facing website. These graduates will work with the cloud engineer to deliver a product that meets all the business requirements specified in sections 3 & 4 of this document.

2. Project Scope

The web development team has already created the necessary code (php) for the SchyndelWork's public facing websites. This code must now be deployed to a public facing website hosted on the cloud.

3. High-Level Requirements

The new system must be able to meet the following business requirements

Business Requirement (A): Creation of Web-Server-A

BR (A).1

- After looking at the business requirements, the cloud engineer has specified that we create a new VM to host Web-Server-A on a "t2.micro" ec2 instance of AWS (or equivalent if using azure).
- On this vm compile & install a version of apache 2.4.25 from source.
- Since performance is a key concern, might be good to use an appropriate mpm.

Note: The cloud engineer is adamant that apache installed via a package manager for Web-Server-A will NOT be accepted.

BR (A).1.1

Web-Server-A will initially be used as staging server so it must serve http via port 8080. Ensure that the port firewall is open & visible.

BR (A).1.2

Server should be installed at **/etc/apache2/schyndel/server_root**

BR (A).1.3

All necessary user key/password/group files for auth to be placed at /etc/apache2/schyndel/server_root/auth

BR (A).1.4

As PHP web developers have been contracted to create site content, your website should have the capability of executing & serving php scripts

BR (A).1.5

- To allow continuity of business, SchyndelWorks requires all work done to be documented.
- You will need to create "business-requirement-a/a-report.txt" which documents all work that you have undertaken.
- Your report must document all the work done as a part of each business requirement.
- If you make any changes to configuration files, it must be commented & reference the business requirement id.
- For example, when setting the port, you will need to add the following comment in your configuration file

  # BR (A).1.1: As per requirement, changed port from 80 to 8080

BR (A).2

To allow ease of use, the server must be capable of dealing with misspelling/capitalization issues.

BR (A).3

- Documents should be served from **/etc/apache2/schyndel/document_root**
- The content to be served has already been written and the source code is available at the following git repository https://github.com/rohit-lakhanpal/schyndel-works-site. Your site needs to serve this content. This sourcecode can be downloaded via the following link https://github.com/rohit-lakhanpal/schyndel-works-site/archive/master.zip

  Hint: You can use the following commands to download the content:

```
mkdir /etc/apache2/schyndel/document_root
cd /etc/apache2/schyndel/document_root
wget https://github.com/rohit-lakhanpal/schyndel-works-site/archive/master.zip
unzip master.zip
rm master.zip
mv -f schyndel-works-site-master/* .
rmdir schyndel-works-site-master
```

BR (A).4

The default document to be served is **index.html then index.shtml then index.php**

BR (A).5

Your server must permit Server Side Includes (SSI) for files with the **.shtml** extension.

BR (A).6

Your site must not permit .gif files from being served.

BR (A).7

- Content in the /secure-basic folder must be protected via basic auth.
- You will need to create users bob & charlie with password wswt All necessary user key/password/group files for auth to be placed at **/etc/apache2/schyndel/server_root/auth**)

BR (A).8

- Content in the /secure-digest folder must be protected via digest auth.
- You will need to create users alice & dean with password wswt All necessary user key/password/group files for auth to be placed at **/etc/apache2/schyndel/server_root/auth**)

BR (A).9

All content served by the web server must respond with the following Response Header

"X-Served-Via: Web-Server-A"

Business Requirement (B): Creation of Web-Server-B

Now that the staging server has been created, a production web server now needs to be setup. This production web server will be identical to "Web-Server-A" except the changes listed below:

BR (B).1

VM to host Web-Server-B on a "t2.large" ec2 instance of AWS (or equivalent if using azure)

(If cost is a worry for you, use a “t2.nano” instance instead)

BR (B).2

Port used to serve documents should be 8050

Ensure that the port firewall is open & visible.

BR (B).3

All content served by the web server must respond with the following Response Header

"X-Served-Via: Web-Server-B"

BR (B).4

- To allow continuity of business, SchyndelWorks requires all work done to be documented.
- Since the since most of the steps are similar to Business Requirement A you don't need to create a report **BUT** for all changes made to configuration files, it must be commented & reference the business requirement id.

  For example, when setting the port, you will need to add the following comment in your configuration file

  # BR (B).2: As per requirement, changed port from 80 to 8050

Business Requirement (C): Creation of Load-Balancer

- Since SchyndelWorks expects a large volume of end users to use their site, they would like to serve content from either Web-Server-A or Web-Server-B via a Load-Balancer.
- As a part of this requirement you will be creating a new VM that will be used as a load-balancer.
- The cloud engineer has instructed you to use "t2.xlarge" ec2 instance of AWS (or equivalent if using azure) for your load-balancer to prevent network saturation constraints).

BR (C).1

- The cloud engineer has instructed you to use Apache 2.4's mod_proxy_balancer module to setup the load balancer.
- To accomplish this, you will need to create a new instance of apache 2.
- The engineer has specified that the apache server on this vm can be installed via a package manager (apt-get install apache2).
- This apache server must serve content via port 80. Ensure that the port firewall is open & visible.
- The actual content served is via Web-Server-A or Web-Server-B (this is just a load balancer).
- The cloud engineer has instructed you to use **mod_lbmethod_byrequests** module as the Load balancing scheduler algorithm.

BR (C).2

- When setting up the Load-Balancer using mod_lbmethod_byrequests, apache gives you the option to set a "**loadfactor**".
- This is the member load factor - a number between 1 (default) and 100, which defines the weighted load to be applied to the member in question.
- The cloud engineer is unsure of what load factor needs to be applied here.
- It is your task to ascertain what is the appropriate loadfactor to be applied & **configure apache to use your loadfactor**.

BR (C).3

- To convince the cloud engineer of your decision made in BR (C).2, you are required to produce a report.
- This report requires you to conduct benchmark OR perf tests (choose ab or httperf) on apache (directing the requests to the load balancer).
- You should run at least 3 load tests on apache with an inital loadfactor applied & then average out the results.
- You should then run at least 3 load tests on apache with an updated loadfactor applied & then average out the results.
- The scripts to load test are /load/cpu.php & /load/io.php.
- Based off estimates from business, your load tests need to allow for
    - /load/cpu.php has a concurrency of 10 & test 150 requests
    - /load/io.php has a concurrency of 10 & test 200 requests.
- You then need to compare the 2 averaged out results sets & state in your report what loadfactor setting is the most appropriate.
- This report can be written as a word file but MUST be submitted as a pdf (business-requirement-c/c-report.pdf).
- It is important that you take valid screenshots of the results of each benchmark test that is carried out. Please add these to your report.
- (Hint: Since the vms differ in spec, might be good to factor that into your calculations of the appropriate load-factor)

  Your cloud engineer has recommended that you create a new vm ("Load-Testing" vm) using a "m4.xlarge" ec2 instance as your load testing server. This is done to ensure that network throughput is not an issue.
  (If cost is a worry for you, use a "t2.micro" instance instead)
    - It has also been recommended that this particular vm ("Load-Testing" vm only) be terminated once you have finished your load tests.
    - On the vm you only need to install:
        - apt-get install apache2-utils (this gives you access to ab)
        - apt-get install httperf (this gives you access to httperf)

BR (C).4

- To allow continuity of business, SchyndelWorks requires all work done to be documented in your report.
- All changes made to configuration files, it must be commented & reference the business requirement id.
- For example, when setting the loadfactor, you will need to add the following comment in your configuration file

  # BR (C).2: As per requirement, set loadfactor to X for node X

Business Requirement (D): Alternative load balancing algorithm

BR (D).1

- As you have already completed "Business Requirement C", the cloud engineer has asked to look at an alternate Load balancing scheduler algorithm (lbmethod_bytraffic or lbmethod_bybusyness or lbmethod_heartbeat).
- You need to pick one and compare it to the performance of lbmethod_byrequests.
- Again, your proof for ascertaining the apporporiate load balancer algorithm must include at least 3 benchmark/perf tests completed for the /load/cpu.php & /load/io.php script with the new algorithm.
- You then need to compare it with your results from the tests you ran as a part of "Business Requirement C" and you need to create a new report.
- This report can be written as a word file but MUST be submitted as a pdf (business-requirement-d/d-report.pdf).

4. Deliverables

A zip file containing the following assets needs to be submitted:

```
/Your-Directory
├── group-info.txt
│
├── links.txt
│
├── /business-requirement-a
│     ├── a-report.txt
│     ├── httpd.conf (for Web-Server-A)
│     │
│    └─── (all auth files)
│
├─── /business-requirement-b
│    ├─── httpd.conf (for Web-Server-B)
│    └─── <<all auth files>>
│
├─── /business-requirement-c
│    ├─── c-report.docx
│    ├─── c-report.pdf
│    ├─── 000-default.conf (for Load-Balancer)
│    └─── (any other config files changed)
│
└─── / business-requirement-d
     ├─── d-report.docx
     ├─── d-report.pdf
     ├─── 000-default.conf (for Load-Balancer)
     └─── (any other config files changed)
```

To assist you with your work, a sample template is available here https://github.com/rohit-lakhanpal/schyndel-works-site-assets/archive/master.zip.

5. High-Level Timeline/Schedule

This project including all its deliverables must be completed & submitted by 16:30 hrs on Monday, 29th May 2017.

APPROVAL AND AUTHORITY TO PROCEED

We approve the project as described above, and authorize the team to proceed.

Name	Title	Date
Ron Van Schyndel	CIO	27/04/2017
Adam Smith	Cloud Engineer	27/08/2017