10/1/2024

Homework 2

IST 615:CLOUD MANAGEMENT

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Part 1 (35 points)

The following website:

https://azure.microsoft.com/en-us/resources/customer-stories/

provides a catalog for many Azure customer success stories (case studies).

Select a customer story from an industry sector of interest to you and answer the following questions in your own words, don't just copy the content from the story:

a. Which company/customer does the story refer to and what is the economic sector where the company offers its products/services?
Solution: The customer is **Swiss International Air Lines (SWISS)**, Switzerland's leading air carrier. SWISS operates in the **airline and transportation sector** as part of the Germany-based Lufthansa Group. It provides air travel services to more than 100 destinations around the world. Additionally, the company has ambitious sustainability goals, aiming to halve its 2019 net CO2 emissions by 2030 and become entirely carbon-neutral by 2050.

b. What were the main drivers for the company/customer to use cloud services?
Solution: SWISS faced end-of-life support for two costly on-premises datacenters and recognized that a shift to the cloud would bring flexibility, scalability, and cost savings. The company wanted to reduce operational and maintenance overhead, increase scalability, and gain better platform stability and security. The cloud migration also aligned with its goals to reduce its carbon footprint within IT infrastructure and support sustainability.

c. What was made more efficient for the customer thanks to the use of cloud services?
Solution: SWISS achieved improved **platform stability** and **enhanced security visibility**. By moving to Microsoft Azure SQL and leveraging Azure services like Azure Storage, Azure NetApp Files, and more, SWISS reduced its operational and maintenance overhead and increased scalability. Furthermore, the shift to a cloud platform allowed the airline to efficiently handle its legacy infrastructure while maintaining business-critical systems.

d. What other benefits were obtained from the use of cloud services?
Solution: SWISS achieved up to **30% cost savings** compared to running on-premises datacenters. The migration also reduced **licensing issues**, enabled **real-time, mission-critical operations** (such as flight and passenger management), and allowed the company to respond more dynamically to peaks in demand by adding temporary capacity. This flexibility was not possible with traditional infrastructure providers.

Additionally, include the following:

- Azure SQL
- Azure Storage accounts
- Azure NetApp Files
- Azure DevOps
- Power Platform (Power Automate, Power BI, Power Apps)

- Microsoft Defender
- Microsoft Entra ID
- Azure Kubernetes Service (AKS)
- Microsoft .NET and SQL Server

f. Link to the customer story

https://customers.microsoft.com/en-us/story/1799824484108434730-swiss-azure-travel-and-transportation-en-switzerland

Part 2 (35 points)

Select an Azure cloud service of interest to you that is not related to Virtual Machine creation (since this has been covered in class) and provide the following:

a. A brief description of the service and its capabilities in your own words (at least 1 paragraph)
Solution: Azure DevOps is a cloud-based service that provides development tools for managing the entire software lifecycle, including planning, development, testing, and delivery. It supports collaborative work across development and IT teams and offers capabilities such as source code management, continuous integration/continuous deployment (CI/CD), and agile project management. Azure DevOps enables developers to build, test, and deploy applications efficiently with infrastructure as code (IaC) and integrates with various programming languages and frameworks.

b. A description of how the service is billed (cost of the service)
Solution: Azure DevOps offers a flexible billing model based on user licenses and usage. It provides a free tier that includes basic features like repository hosting, CI/CD pipelines, and limited parallel jobs. Additional features, such as advanced parallel jobs and more user licenses, are billed based on usage. Users can scale their DevOps tools according to the size of their team and project needs.

c. A link to the official description of the service AND a link to a tutorial (doesn't need to be from Microsoft) that you think may help in understanding and/or testing the service
Solution:
https://medium.com/abn-amro-developer/azure-devops-pipeline-tutorial-part-1-ci-pipeline-fundamentals-41e590ff1d80
https://www.javatpoint.com/azure-devops-pipeline

Part 3 (30 points)

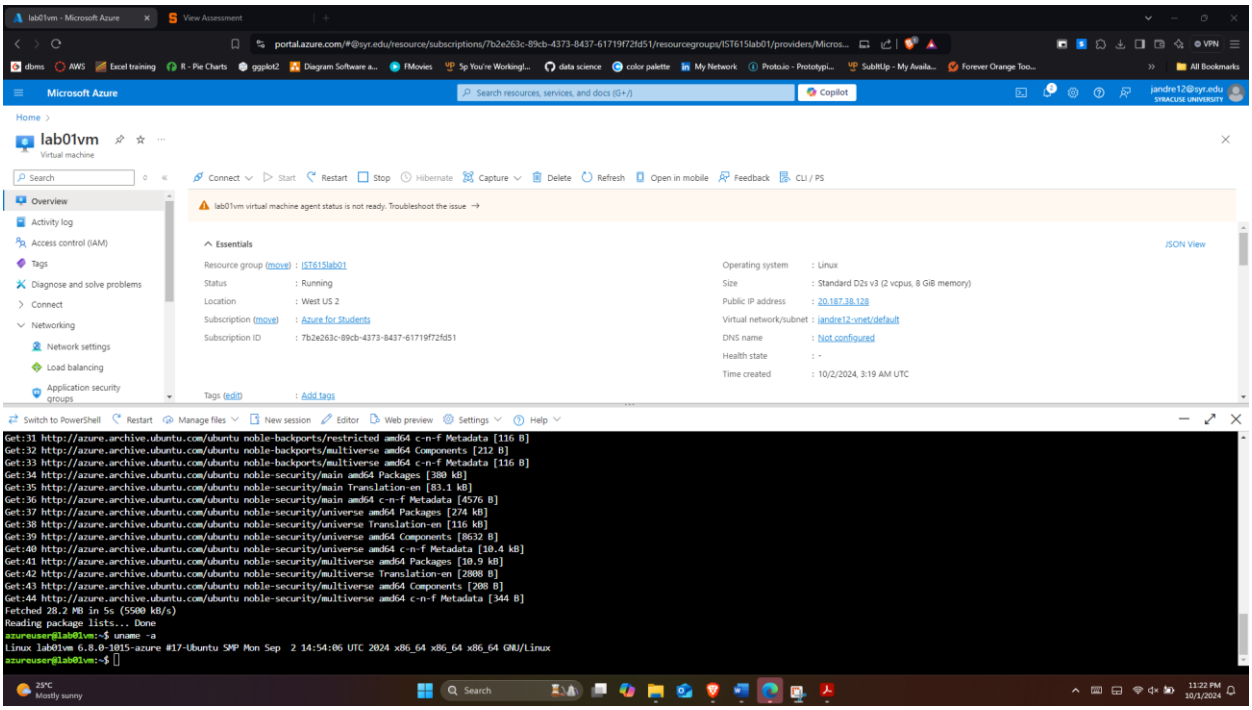
Create a new virtual machine in Azure that uses a "Ubuntu Server 22.04 LTS – x64 Gen2" operating system image. The size of the VM can be Azure's Standard_D2s_v3 (2 vcpus, 8 GiB memory) but VMs with 2 vcpus and 4 GiB of memory are also acceptable. You can follow similar steps to those mentioned in Lab #1 to complete this task up until section 6.2. You don't need to install any additional software (e.g.

Apache) in the new VM. You should provide a name to the VM and to the SSH keys that is of your choosing.

To verify and document completion of this task, perform the following actions:

a. Provide a screenshot of your Azure Portal showing the new VM's details.

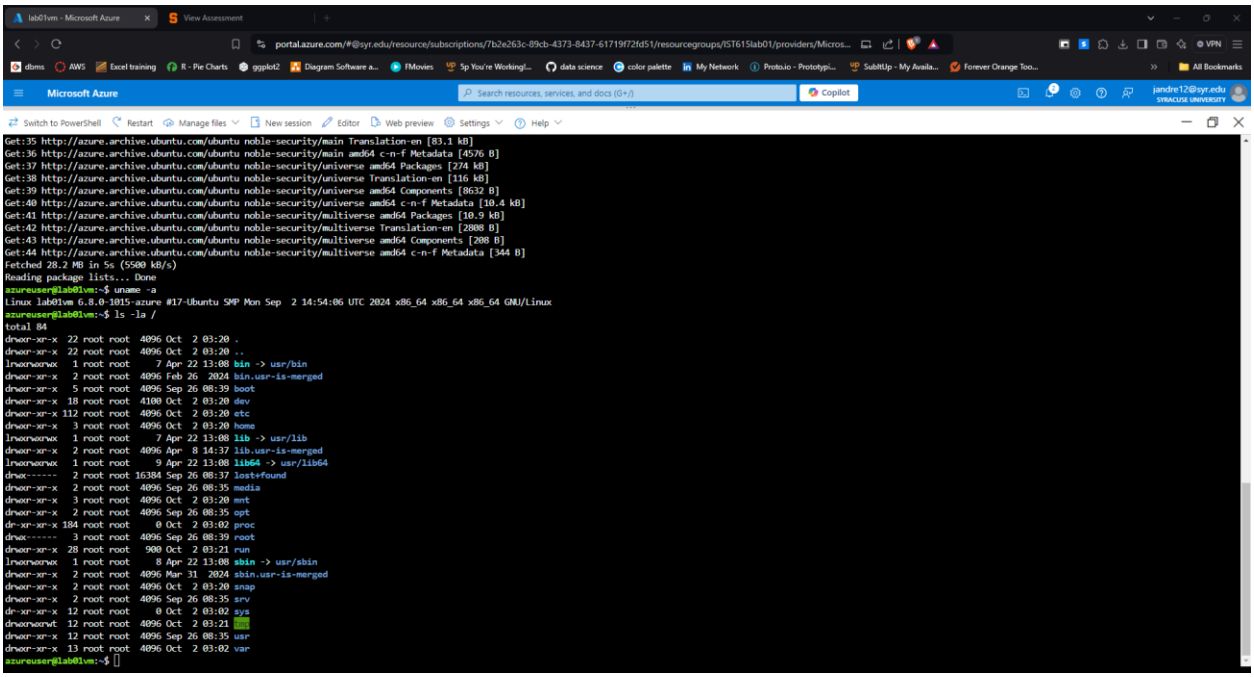
Provided below is the screen of the working Virtual Machine along with the details such as Public Key.

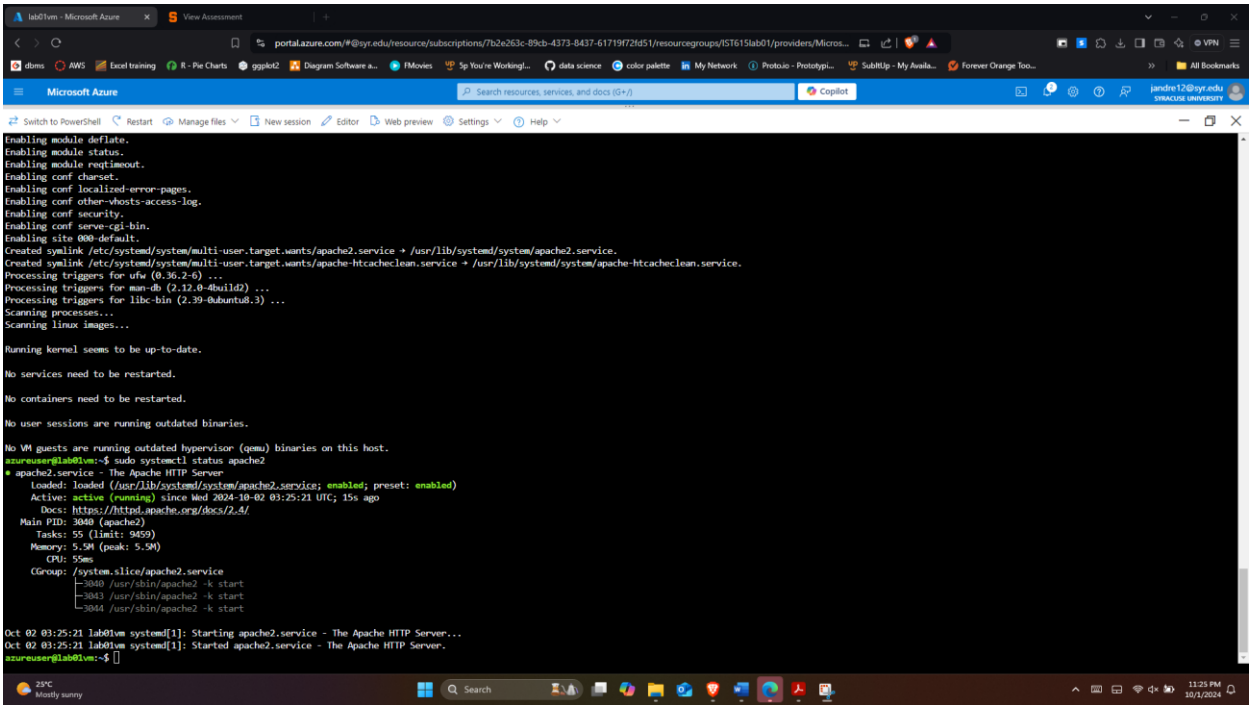


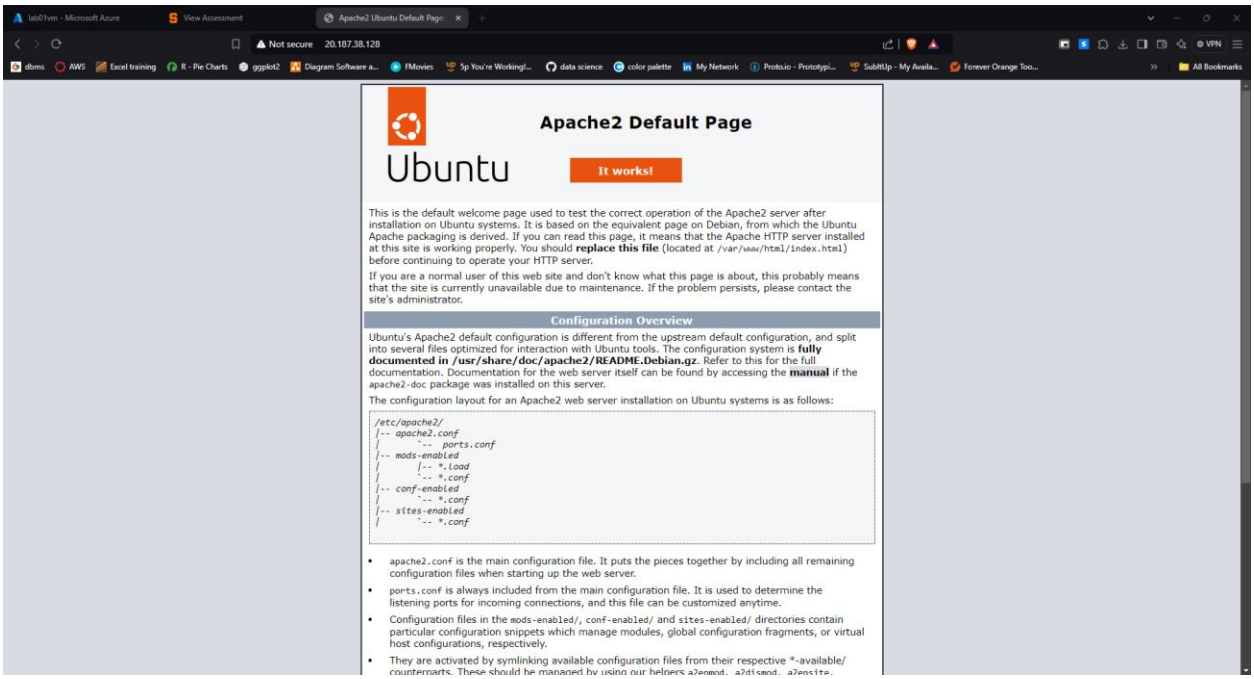
b. Provide a screenshot that shows that you can SSH into the new VM. Please note that it is preferable that you connect to the VM directly from your laptop in a similar fashion to how ssh connections were established for the VM used in lab 2. Even though lab 2 was done with AWS, once you have your ssh private key (for your Azure VM) on your laptop, you can connect to it in a similar way. As an alternative you can connect to your new (Azure) VM from the Azure Cloud Shell. Once you have completed the previous tasks, you should stop the new VM, don't delete it as it will be used in our next class session.

Solution: In the following screenshot we see:

- The **Status** indicates the VM is running smoothly, and it's using the **Standard D2s v3** configuration with 2 vCPUs and 8 GB of memory.
- The command **ls -la /** lists the contents of the root directory (/) on your VM.
- Apache is running successfully. The output indicates that the service is **active (running)** since Wed Oct 2 03:25:21 UTC 2024.
- This image shows the **Apache2 Default Page** loaded in your web browser.


lab01vm - Microsoft Azure
View Assessment
portal.azure.com/#@syr.edu/resource/subscriptions/7b2e263c-89cb-4373-8437-61719f72fd51/resourcegroups/IST615lab01/providers/Micros...
Microsoft Azure
Search resources, services, and docs (G+/)
Copilot
jandre12@syr.edu
SYRACUSE UNIVERSITY
Switch to PowerShell
Restart
Manage files
New session
Editor
Web preview
Settings
Help
Get:35 http://azure.archive.ubuntu.com/ubuntu noble-security/main Translation-en [83.1 kB]
Get:36 http://azure.archive.ubuntu.com/ubuntu noble-security/main amd64 c-n-f Metadata [4576 B]
Get:37 http://azure.archive.ubuntu.com/ubuntu noble-security/universe amd64 Packages [274 kB]
Get:38 http://azure.archive.ubuntu.com/ubuntu noble-security/universe Translation-en [116 kB]
Get:39 http://azure.archive.ubuntu.com/ubuntu noble-security/universe amd64 Components [8632 B]
Get:40 http://azure.archive.ubuntu.com/ubuntu noble-security/universe amd64 c-n-f Metadata [10.4 kB]
Get:41 http://azure.archive.ubuntu.com/ubuntu noble-security/multiverse amd64 Packages [10.9 kB]
Get:42 http://azure.archive.ubuntu.com/ubuntu noble-security/multiverse Translation-en [2808 B]
Get:43 http://azure.archive.ubuntu.com/ubuntu noble-security/multiverse amd64 Components [208 B]
Get:44 http://azure.archive.ubuntu.com/ubuntu noble-security/multiverse amd64 c-n-f Metadata [344 B]
Fetched 28.2 MB in 5s (5500 kB/s)
Reading package lists... Done
azureuser@lab01vm:~$ uname -a
Linux lab01vm 6.8.0-1015-azure #17-Ubuntu SMP Mon Sep 2 14:54:06 UTC 2024 x86_64 x86_64 x86_64 GNU/Linux
azureuser@lab01vm:~$ ls -la /
total 84
drwxr-xr-x 22 root root 4096 Oct 2 03:20 .
drwxr-xr-x 22 root root 4096 Oct 2 03:20 ..
lrwxrwxrwx 1 root root 7 Apr 22 13:08 bin -> usr/bin
drwxr-xr-x 2 root root 4096 Feb 26 2024 bin.usr-is-merged
drwxr-xr-x 5 root root 4096 Sep 26 08:39 boot
drwxr-xr-x 18 root root 4100 Oct 2 03:20 dev
drwxr-xr-x 112 root root 4096 Oct 2 03:20 etc
drwxr-xr-x 3 root root 4096 Oct 2 03:20 home
lrwxrwxrwx 1 root root 7 Apr 22 13:08 lib -> usr/lib
drwxr-xr-x 2 root root 4096 Apr 8 14:37 lib.usr-is-merged
lrwxrwxrwx 1 root root 9 Apr 22 13:08 lib64 -> usr/lib64
drwx------ 2 root root 16384 Sep 26 08:37 lost+found
drwxr-xr-x 2 root root 4096 Sep 26 08:35 media
drwxr-xr-x 3 root root 4096 Oct 2 03:20 mnt
drwxr-xr-x 2 root root 4096 Sep 26 08:35 opt
dr-xr-xr-x 184 root root 0 Oct 2 03:02 proc
drwx------ 3 root root 4096 Sep 26 08:39 root
drwxr-xr-x 28 root root 900 Oct 2 03:21 run
lrwxrwxrwx 1 root root 8 Apr 22 13:08 sbin -> usr/sbin
drwxr-xr-x 2 root root 4096 Mar 31 2024 sbin.usr-is-merged
drwxr-xr-x 2 root root 4096 Oct 2 03:20 snap
drwxr-xr-x 2 root root 4096 Sep 26 08:35 srv
dr-xr-xr-x 12 root root 0 Oct 2 03:02 sys
drwxrwxrwt 12 root root 4096 Oct 2 03:21 tmp
drwxr-xr-x 12 root root 4096 Sep 26 08:35 usr
drwxr-xr-x 13 root root 4096 Oct 2 03:02 var
azureuser@lab01vm:~$


lab01vm - Microsoft Azure
View Assessment
portal.azure.com/#@syr.edu/resource/subscriptions/7b2e263c-89cb-4373-8437-61719f72fd51/resourcegroups/IST615lab01/providers/Micros...
Microsoft Azure
Search resources, services, and docs (G+/)
Copilot
jandre12@syr.edu
SYRACUSE UNIVERSITY
Switch to PowerShell
Restart
Manage files
New session
Editor
Web preview
Settings
Help
Enabling module deflate.
Enabling module status.
Enabling module reqtimeout.
Enabling conf charset.
Enabling conf localized-error-pages.
Enabling conf other-vhosts-access-log.
Enabling conf security.
Enabling conf serve-cgi-bin.
Enabling site 000-default.
Created symlink /etc/systemd/system/multi-user.target.wants/apache2.service → /usr/lib/systemd/system/apache2.service.
Created symlink /etc/systemd/system/multi-user.target.wants/apache-htcacheclean.service → /usr/lib/systemd/system/apache-htcacheclean.service.
Processing triggers for ufw (0.36.2-6) ...
Processing triggers for man-db (2.12.0-4build2) ...
Processing triggers for libc-bin (2.39-0ubuntu8.3) ...
Scanning processes...
Scanning linux images...
Running kernel seems to be up-to-date.
No services need to be restarted.
No containers need to be restarted.
No user sessions are running outdated binaries.
No VM guests are running outdated hypervisor (qemu) binaries on this host.
azureuser@lab01vm:~$ sudo systemctl status apache2
● apache2.service - The Apache HTTP Server
Loaded: loaded (/usr/lib/systemd/system/apache2.service; enabled; preset: enabled)
Active: active (running) since Wed 2024-10-02 03:25:21 UTC; 15s ago
Docs: https://httpd.apache.org/docs/2.4/
Main PID: 3040 (apache2)
Tasks: 55 (limit: 9459)
Memory: 5.5M (peak: 5.5M)
CPU: 55ms
CGroup: /system.slice/apache2.service
├─3040 /usr/sbin/apache2 -k start
├─3043 /usr/sbin/apache2 -k start
└─3044 /usr/sbin/apache2 -k start
Oct 02 03:25:21 lab01vm systemd[1]: Starting apache2.service - The Apache HTTP Server...
Oct 02 03:25:21 lab01vm systemd[1]: Started apache2.service - The Apache HTTP Server.
azureuser@lab01vm:~$
25°C
Mostly sunny
Search
11:25 PM
10/1/2024


lab01vm - Microsoft Azure
View Assessment
Apache2 Ubuntu Default Page:
Not secure 20.187.38.128
Apache2 Default Page
Ubuntu
It works!
This is the default welcome page used to test the correct operation of the Apache2 server after installation on Ubuntu systems. It is based on the equivalent page on Debian, from which the Ubuntu Apache packaging is derived. If you can read this page, it means that the Apache HTTP server installed at this site is working properly. You should replace this file (located at /var/www/html/index.html) before continuing to operate your HTTP server.
If you are a normal user of this web site and don't know what this page is about, this probably means that the site is currently unavailable due to maintenance. If the problem persists, please contact the site's administrator.
Configuration Overview
Ubuntu's Apache2 default configuration is different from the upstream default configuration, and split into several files optimized for interaction with Ubuntu tools. The configuration system is fully documented in /usr/share/doc/apache2/README.Debian.gz. Refer to this for the full documentation. Documentation for the web server itself can be found by accessing the manual if the apache2-doc package was installed on this server.
The configuration layout for an Apache2 web server installation on Ubuntu systems is as follows:
/etc/apache2/
|-- apache2.conf
| `-- ports.conf
|-- mods-enabled
| |-- *.load
| `-- *.conf
|-- conf-enabled
| `-- *.conf
|-- sites-enabled
| `-- *.conf
apache2.conf is the main configuration file. It puts the pieces together by including all remaining configuration files when starting up the web server.
ports.conf is always included from the main configuration file. It is used to determine the listening ports for incoming connections, and this file can be customized anytime.
Configuration files in the mods-enabled/, conf-enabled/ and sites-enabled/ directories contain particular configuration snippets which manage modules, global configuration fragments, or virtual host configurations, respectively.
They are activated by symlinking available configuration files from their respective *-available/ counterparts. These should be managed by using our helpers a2enmod, a2dismod, a2ensite,