

# Cygwin & Ubuntu Linux Machine

Lab 01b

by

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Deep Azure @McKesson

# Steps

1. Set up Cygwin on your laptop (to remotely connect your Linux VM in Azure cloud)
2. Generate SSH Key Pair to connect to your Linux Ubuntu securely.
3. Create Linux Ubuntu VM in Azure.
  - Install Apache Web Server.
4. Connect remotely to your new Linux Ubuntu VM using Cygwin.
  - Test reaching your Home page from your browser.

# I. SET UP CYGWIN (OR YOU COULD USE PUTTY)

# What is Cygwin?

- A windows terminal that allows you to use Linux/Unix commands from your Windows system.
- For Windows users, use Cygwin or PuTTY to connect to remote Linux / Unix systems in the Cloud. You can also use WinSCP or any other secure shell / secure copy utility.
- For Macintosh users, use Terminal window – “you don’t need to install a third-party client like PuTTY to connect to your cloud server via Secure Shell (SSH). Terminal is a terminal emulation program included with Mac OS X that you can use to run SSH.”<sup>1</sup>

# Where do you get Cygwin?

**<https://cygwin.com/index.html>**

**This is the home of the Cygwin project**

**What...**

**...is it?**

Cygwin is:

- a large collection of GNU and Open Source tools which provide functionality similar to a [Linux distribution](#) on Windows.
- a DLL (cygwin1.dll) which provides substantial POSIX API functionality.

**...isn't it?**

Cygwin is not:

- a way to run native Linux apps on Windows. You must rebuild your application *from source* if you want it to run on Windows.
- a way to magically make native Windows apps aware of UNIX® functionality like signals, ptys, etc. Again, you need to build your apps *from source* if you want to take advantage of Cygwin functionality.

The Cygwin DLL currently works with all recent, commercially released x86 32 bit and 64 bit versions of Windows, starting with Windows XP SP3.

# How to Install Cygwin (1 of 2)

The screenshot shows the Cygwin website at <https://cygwin.com/install>. The browser's address bar and tabs are visible at the top. On the left, a sidebar menu lists various options, with 'Install Cygwin' highlighted by a red rectangle. The main content area features the 'Cygwin' logo in a large, dark red font, followed by the tagline 'Get that [Linux](#) feeling - on Windows'. Below this, the heading 'Installing and Updating Cygwin Packages' is displayed in the same dark red font. Underneath, there are three sub-sections, each with a heading in dark red: 'Installing and Updating Cygwin for 32-bit versions of Windows', 'Installing and Updating Cygwin for 64-bit versions of Windows', and 'General installation notes'. The text in these sections provides instructions on running setup-x86.exe or setup-x86\_64.exe and verifying signatures. The sidebar menu includes links for Cygwin, Install Cygwin, Update Cygwin, Search Packages, Licensing Terms, Cygwin/X, Community, Reporting Problems, Mailing Lists, Newsgroups, IRC channels, Gold Stars, Mirror Sites, Donations, Documentation, FAQ, User's Guide, API Reference, Acronyms, Contributing, Snapshots, Source in Git, Cygwin Packages, and Related Sites.

Cygwin

- Install Cygwin
- Update Cygwin
- Search Packages
- Licensing Terms

Cygwin/X

Community

- Reporting Problems
- Mailing Lists
- Newsgroups
- IRC channels
- Gold Stars
- Mirror Sites
- Donations

Documentation

- FAQ
- User's Guide
- API Reference
- Acronyms

Contributing

- Snapshots
- Source in Git
- Cygwin Packages

Related Sites

## Cygwin

Get that [Linux](#) feeling - on Windows

## Installing and Updating Cygwin Packages

### Installing and Updating Cygwin for 32-bit versions of Windows

Run [setup-x86.exe](#) any time you want to update or install a Cygwin package for 32-bit windows. The [signature](#) for [setup-x86.exe](#) can be used to verify the validity of this binary using [this](#) public key.

### Installing and Updating Cygwin for 64-bit versions of Windows

Run [setup-x86\\_64.exe](#) any time you want to update or install a Cygwin package for 64-bit windows. The [signature](#) for [setup-x86\\_64.exe](#) can be used to verify the validity of this binary using [this](#) public key.

### General installation notes

When installing packages for the first time, `setup*.exe` *does not install every package*. Only the **minimal base packages** from the Cygwin distribution are installed by default, which takes up about 100 MB.

Clicking on categories and packages in the `setup*.exe` package installation screen allows you to select what is

# Installing Cygwin (2 of 2)

- Select setup-x86\_64.exe if you are on a 64 bit computer or setup-x86.exe if you are on a 32 bit computer.
- If you do not know which bit version your computer is follow steps on next slide.



The screenshot shows the Cygwin website at <https://cygwin.com/install.html>. The page has a dark teal sidebar on the left with navigation links. The main content area has a large 'Cygwin' header in maroon, followed by the tagline 'Get that [Linux](#) feeling - on Windows'. Below this is a section titled 'Installing and Updating Cygwin Packages' in maroon. Under this section, there are two sub-sections: 'Installing and Updating Cygwin for 32-bit versions of Windows' and 'Installing and Updating Cygwin for 64-bit versions of Windows'. A red arrow points from the text 'Select setup-x86\_64.exe' in the list above to the link 'setup-x86\_64.exe' in the 64-bit section. The link is highlighted with a red box. Below the 64-bit section is a 'General installation notes' section.

Cygwin  
Install Cygwin  
Update Cygwin  
Search Packages  
Licensing Terms

Cygwin/X

Community  
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FAQ  
User's Guide  
API Reference  
Acronyms

Contributing  
Snapshots  
Source in GIT  
Cygwin Packages

Related Sites  
Red Hat Cygwin Product

# Cygwin

Get that [Linux](#) feeling - on Windows

## Installing and Updating Cygwin Packages

### Installing and Updating Cygwin for 32-bit versions of Windows

Run [setup-x86.exe](#) any time you want to update or install a Cygwin package for 32-bit windows. The [signature](#) for [setup-x86.exe](#) can be used to verify the validity of this binary using [this](#) public key.

### Installing and Updating Cygwin for 64-bit versions of Windows

Run [setup-x86\\_64.exe](#) any time you want to update or install a Cygwin package for 64-bit windows. The [signature](#) for [setup-x86\\_64.exe](#) can be used to verify the validity of this binary using [this](#) public key.

### General installation notes

When installing packages for the first time, setup\*.exe *does not install every package*. Only the **minimal base packages** from the Cygwin distribution are installed by default, which takes up about 100 MB.

Clicking on categories and packages in the setup\*.exe package installation screen allows you to select what is installed or updated.

# Check your computer's System Type

- Locate 'System' under your computers Control Panel
- If you have Win 7 this will be in: Control Panel -> System and Security -> System
- If you have Win 10 this will be in: Control Panel -> System

[View basic information about your computer](#)

Windows edition

Windows 10 Home

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System

Manufacturer:	Dell
Model:	Inspiron 5423
Processor:	Intel(R) Core(TM) i3-2367M CPU @ 1.40GHz 1.40 GHz
Installed memory (RAM):	6.00 GB (5.87 GB usable)
System type:	64-bit Operating System, x64-based processor
Pen and Touch:	No Pen or Touch Input is available for this Display

Dell support

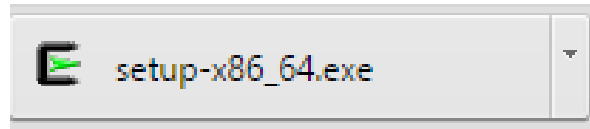
Website:

[Online support](#)

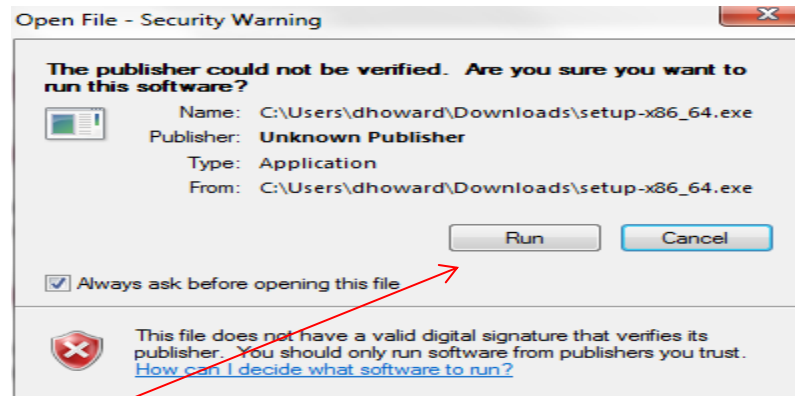


# Setup.exe

1. You will see setup.exe on bottom left of your browser.  
(the download is fast).

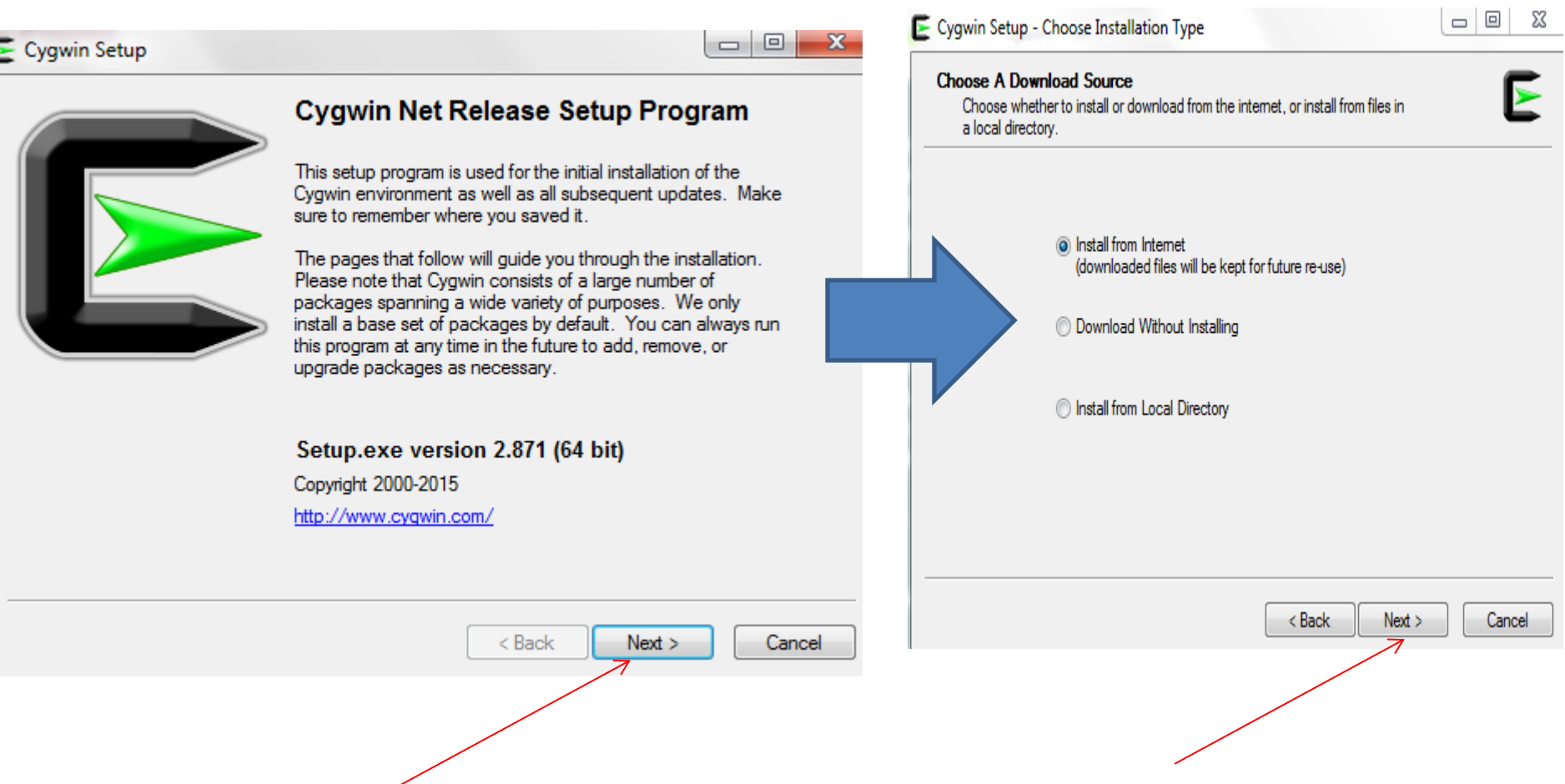


2. Select setup.exe and the following message will appear:

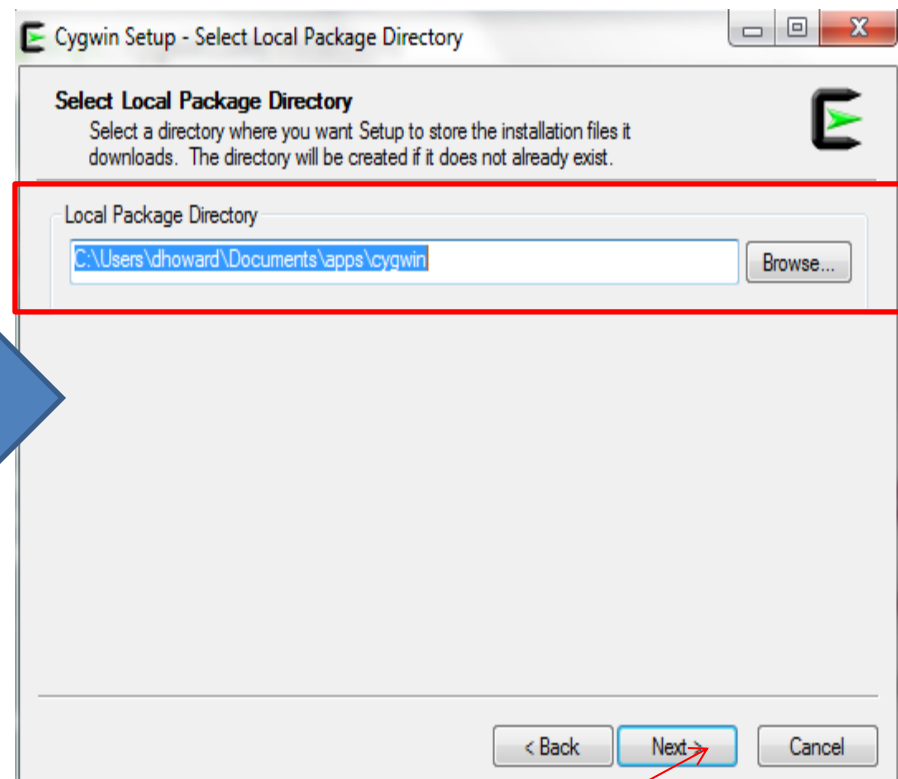
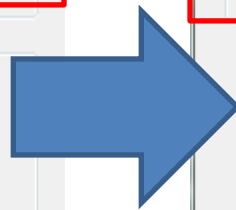
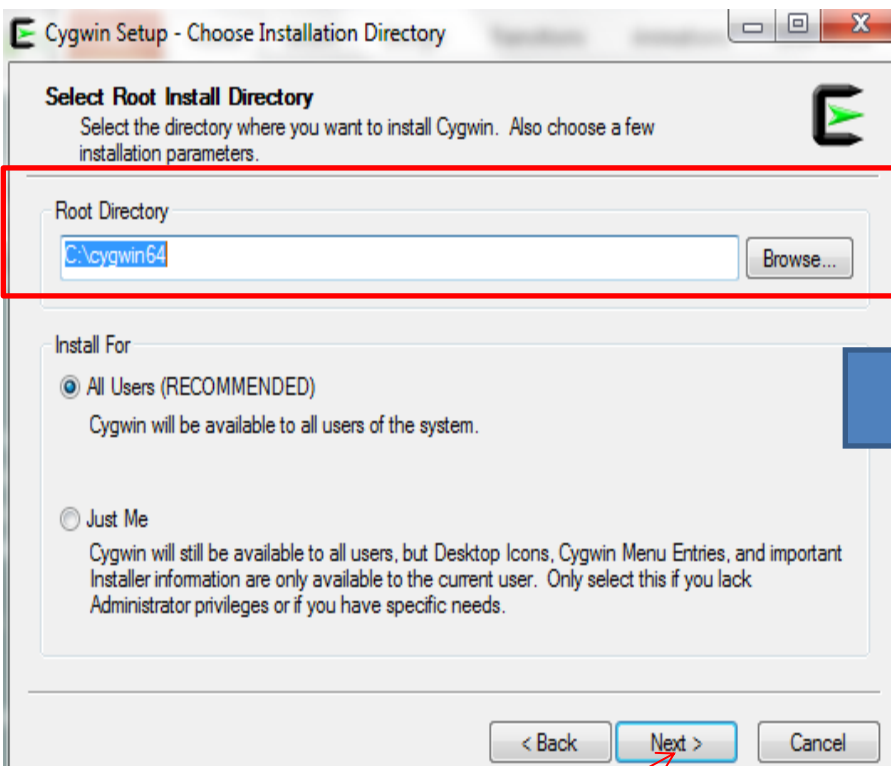


3. Select Run then select Yes to continue.

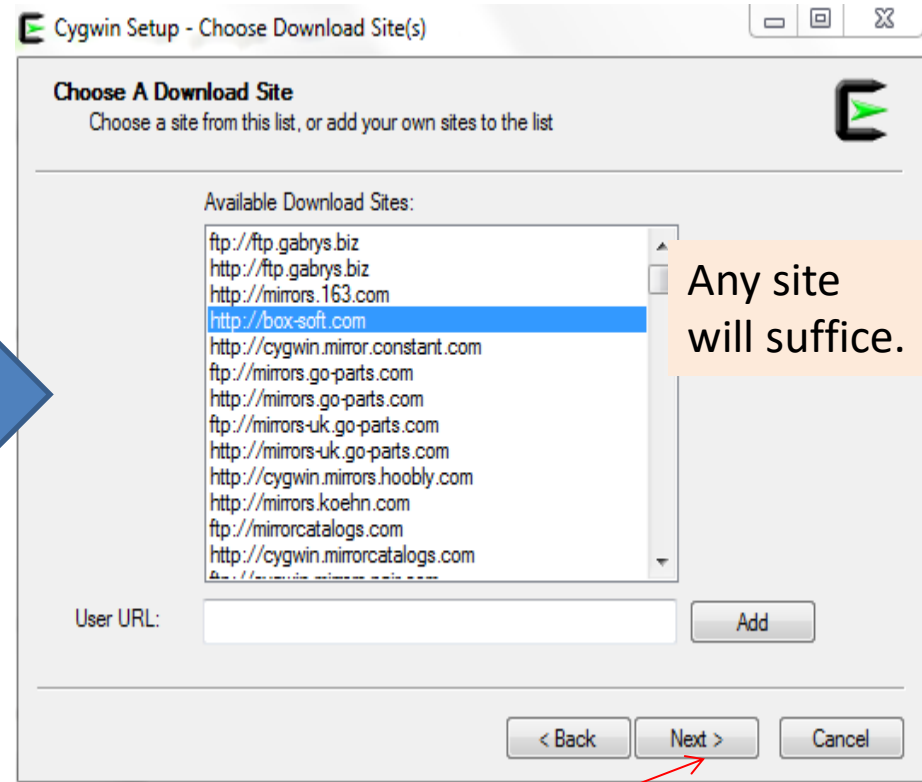
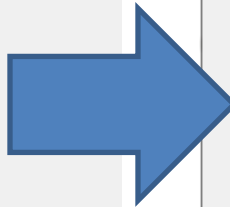
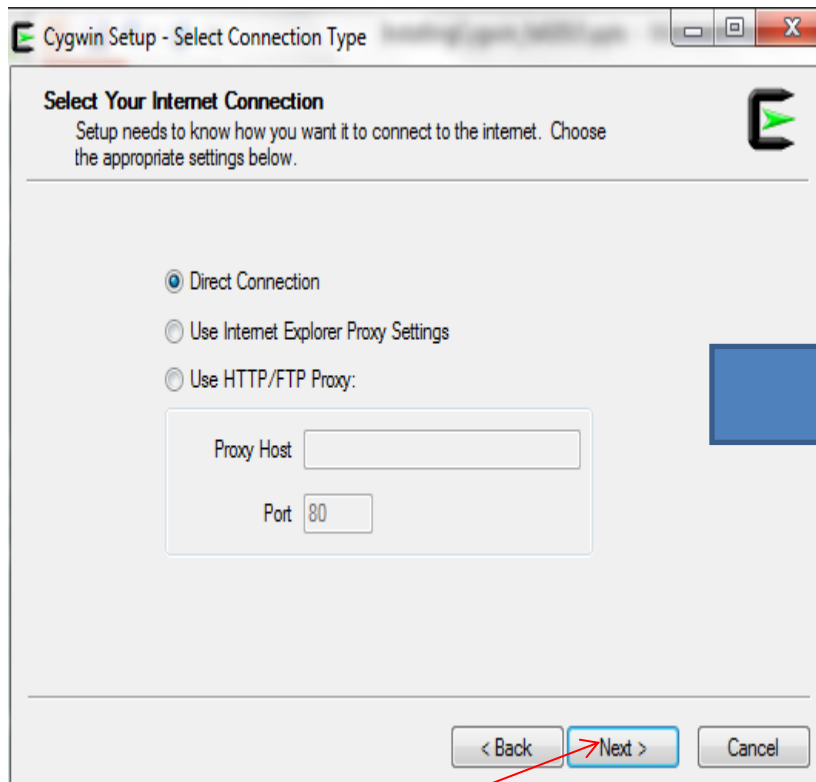
# Continue with Installation...



# Choose your Cygwin installation and local package directory (default)

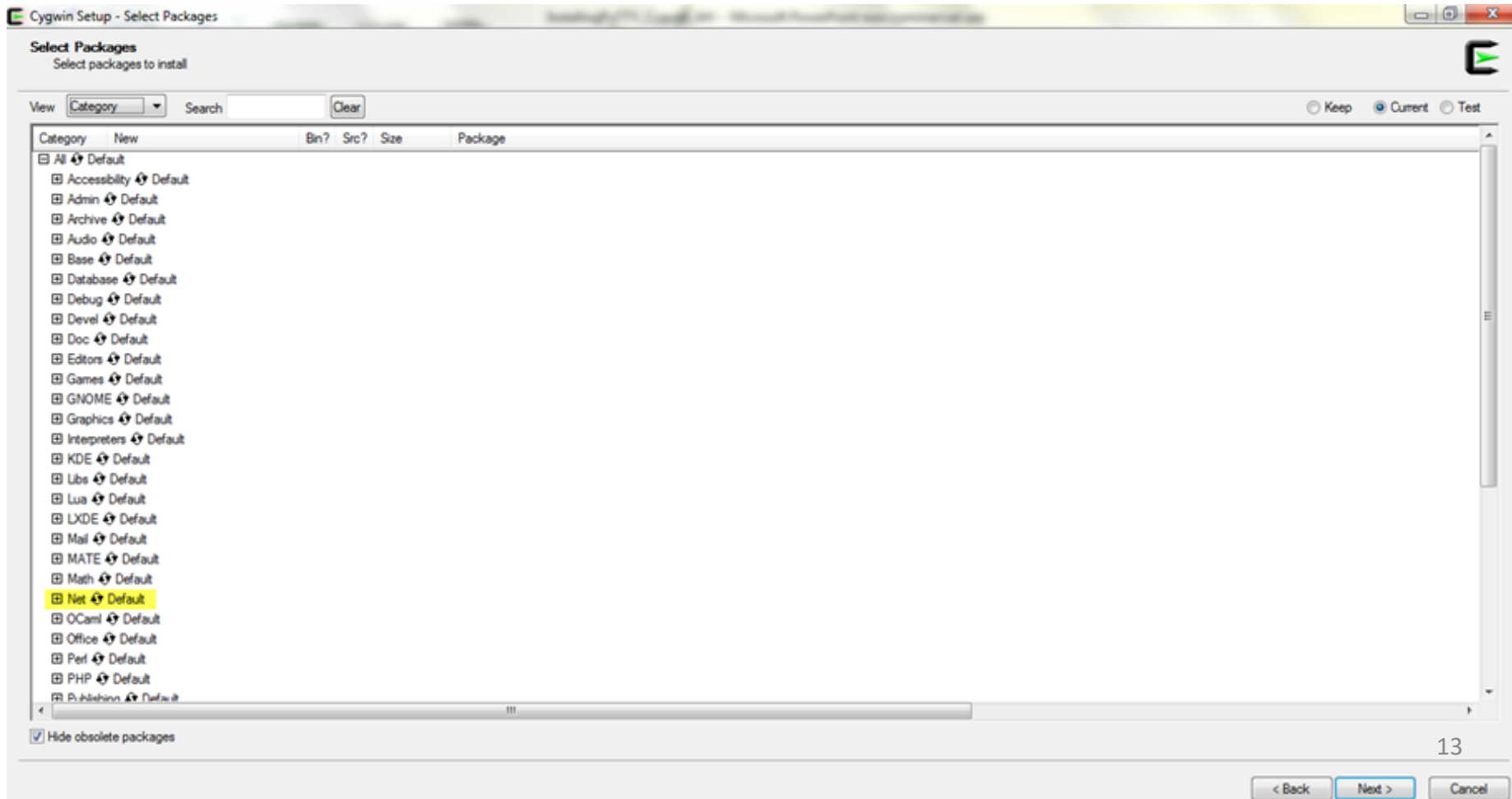


# Select your connection to the Internet site to download Cygwin files



# Select Packages to Install

- Files will be downloaded then you will be asked what file(s) to select.
- **It is very important to follow these next steps**
- You need to expand the Net Category to download openSSH and openSSL

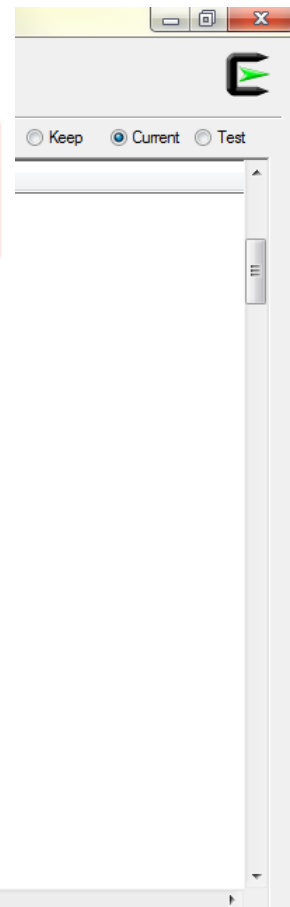
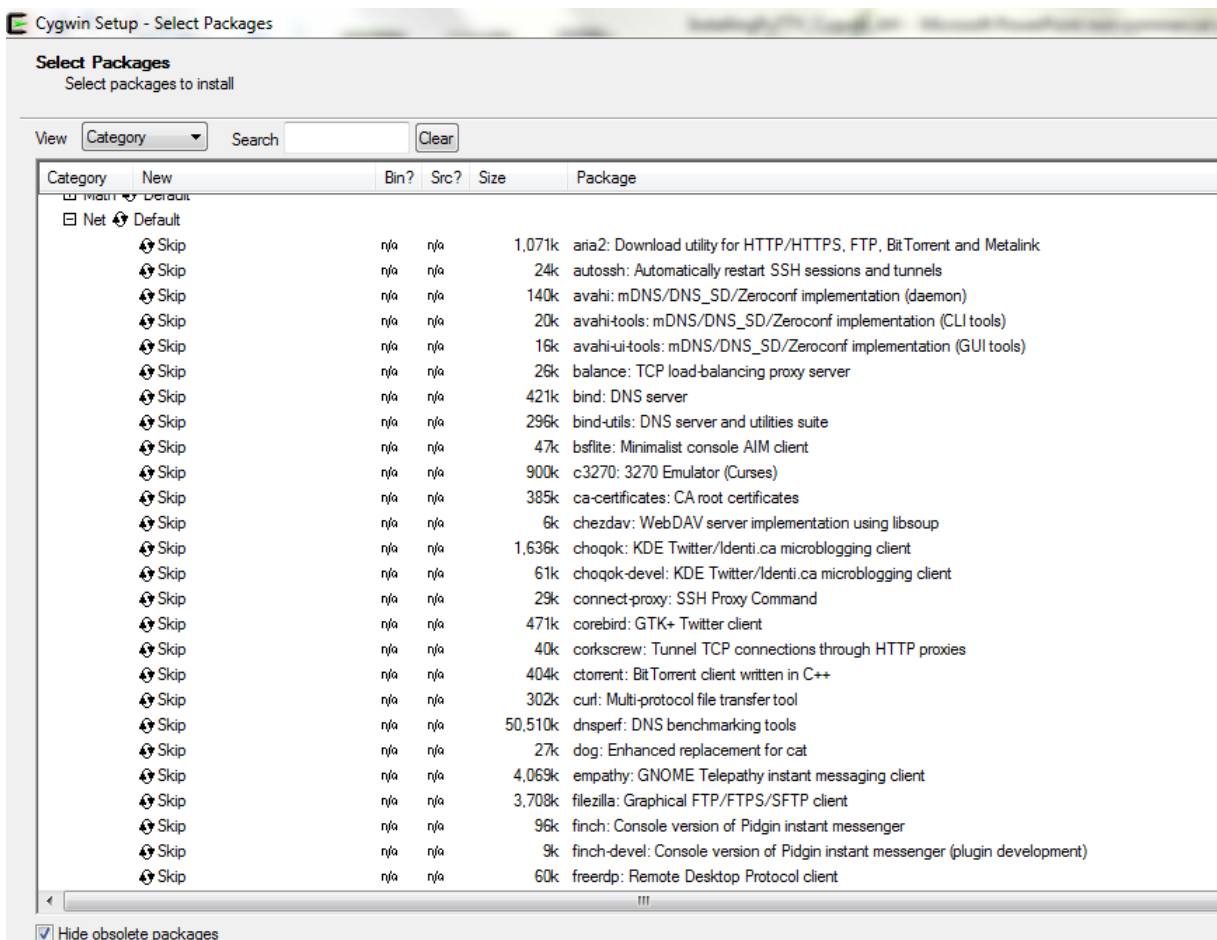


# OpenSSH and OpenSSL

- You select Open SSH / Open SSL to allow secure logins and encrypted copying over the internet. The Open SSH and Open SSL is located in the Net category. (see next slide for expansion of Net).

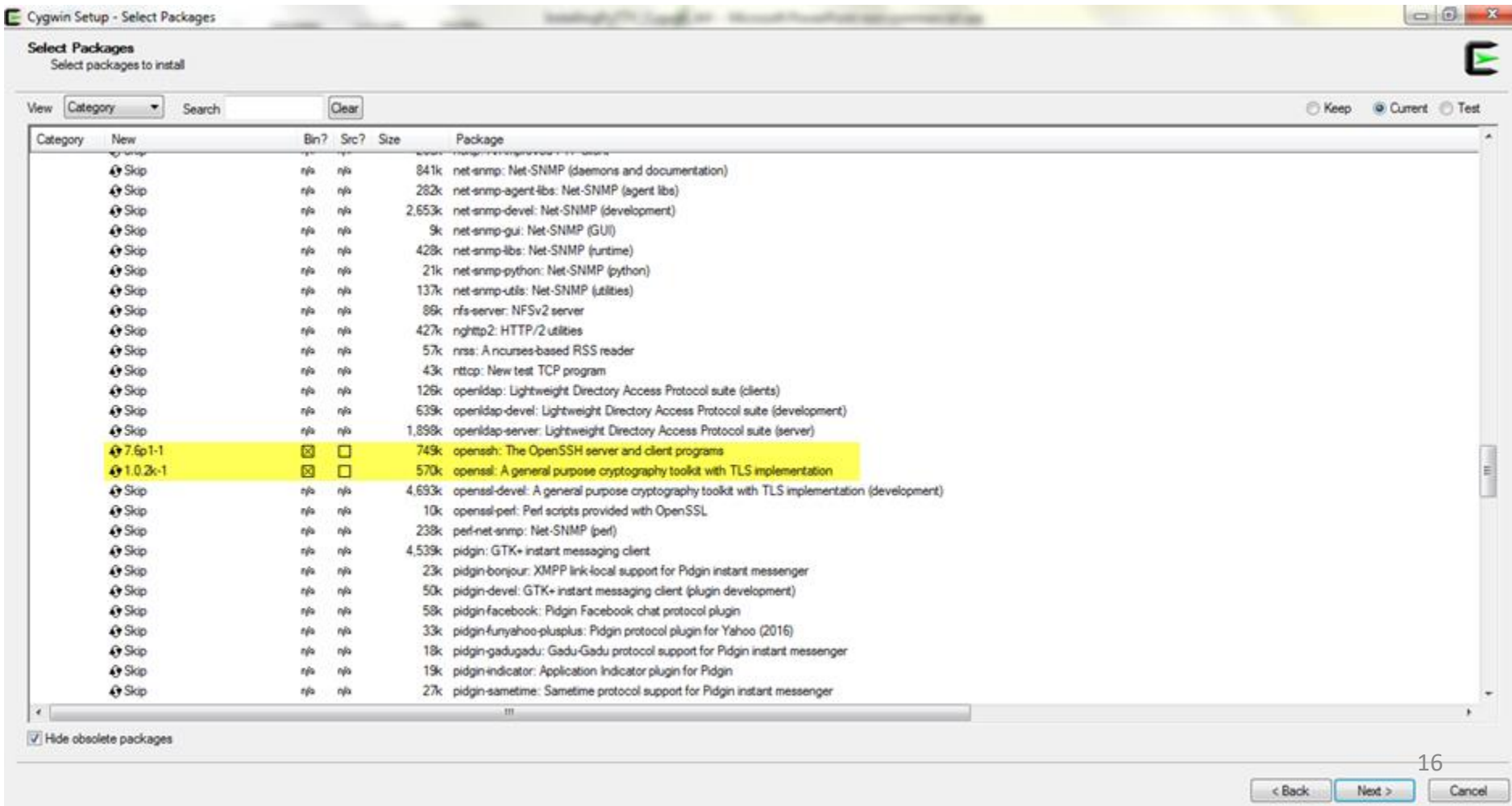
# Scroll thru Net category...

- Here's what Net looks like when expanded. Note: You must scroll down to find the Net Category. **(Don't touch that Next button just yet!)**



# Select Open SSH and Open SSL packages

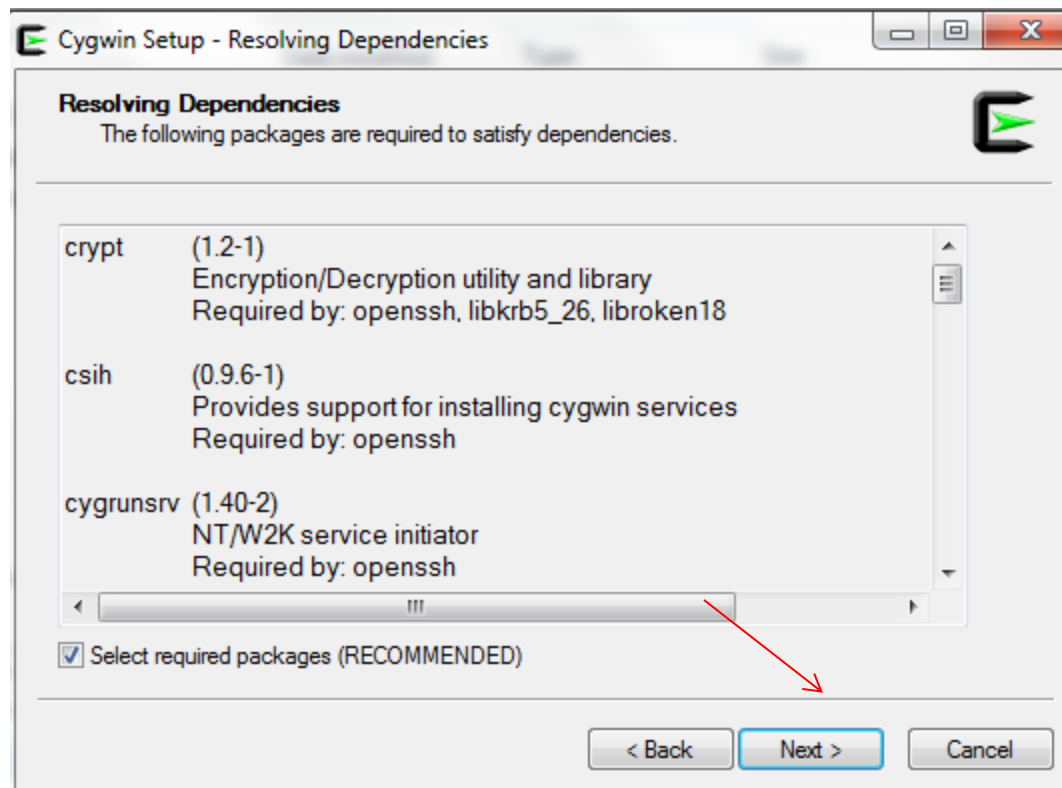
- Click on Skip next to openSSH and OpenSSL until the latest versions appear (See below) and then select Next





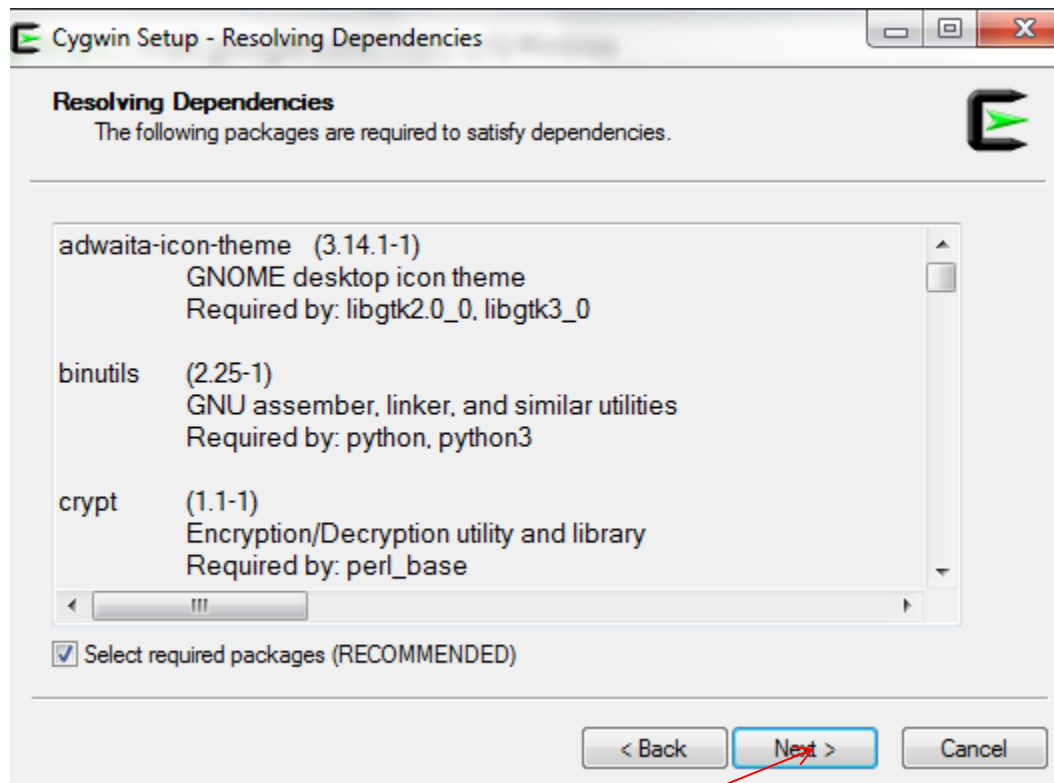
# Resolve Dependencies

- Select the defaults provided.



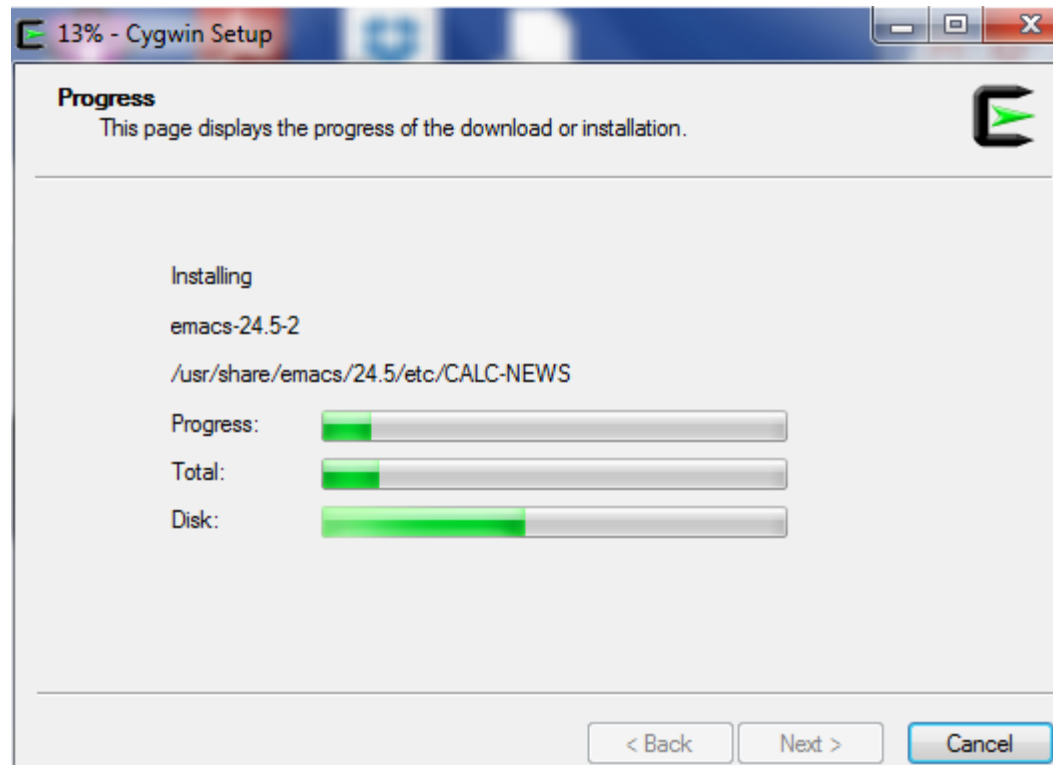
# Select Packages to install

- Select the dependencies.

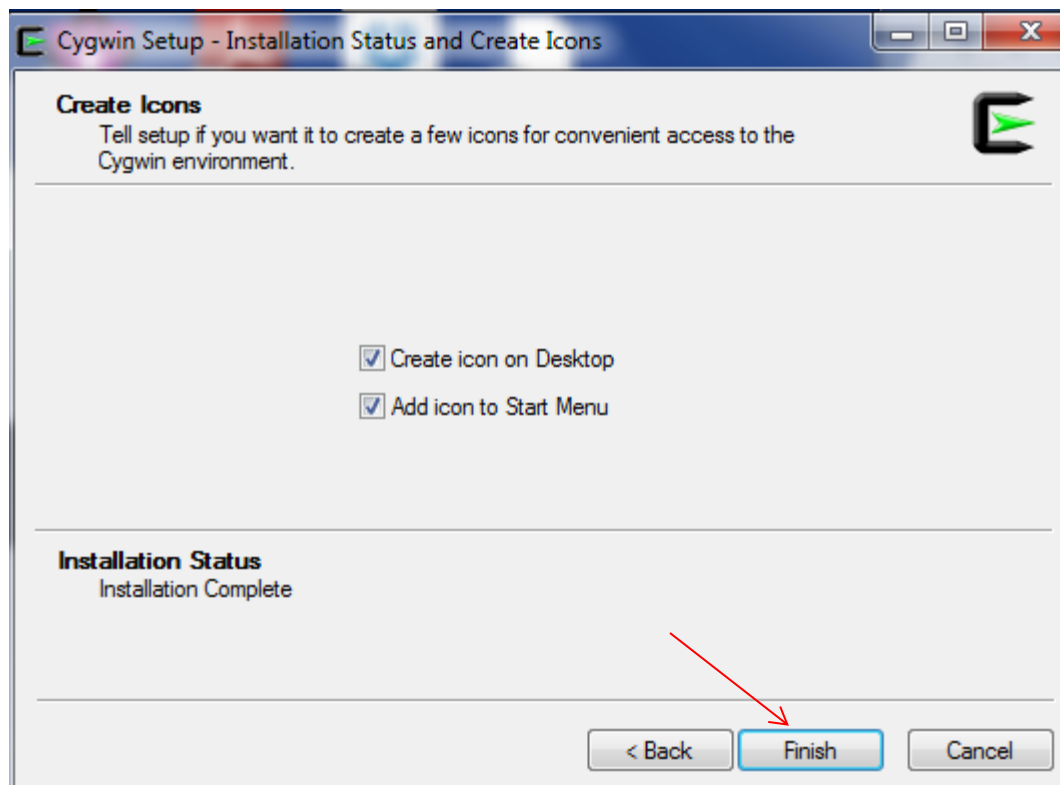


# Download and Setup...

- This may be quick or may take 40-60 minutes or more...!

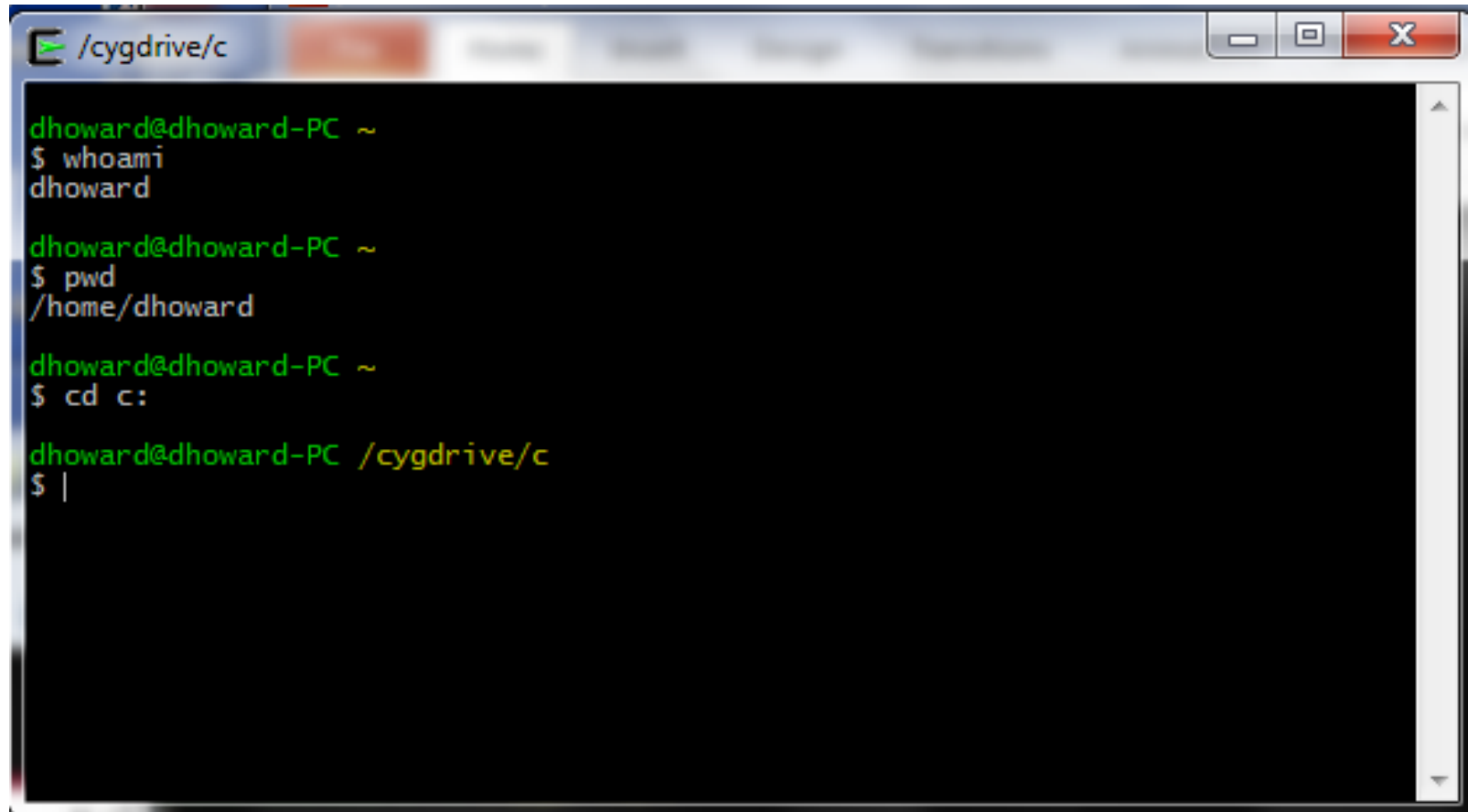


# Final Step



# Cygwin Terminal Window looks like:

- Now you can run Linux / Unix commands (whoami, pwd, ...)



The image shows a screenshot of a Cygwin terminal window. The window has a title bar with standard Windows window controls (minimize, maximize, close) and a title text that reads "/cygdrive/c". The terminal itself has a black background with green text. It shows a series of commands being entered and executed by a user named "dhoward" on a machine named "dhoward-PC". The commands and their outputs are: "whoami" returns "dhoward", "pwd" returns "/home/dhoward", and "cd c:" returns the prompt. The prompt changes to "/cygdrive/c" after the "cd" command. The prompt is always "\$ " followed by a vertical bar.

```
/cygdrive/c  
dhoward@dhoward-PC ~  
$ whoami  
dhoward  
  
dhoward@dhoward-PC ~  
$ pwd  
/home/dhoward  
  
dhoward@dhoward-PC ~  
$ cd c:  
  
dhoward@dhoward-PC /cygdrive/c  
$ |
```

# Helpful Linux Commands

<http://linuxide.com/linux-command/essential-linux-basic-commands/>

```
dhoward@dhoward-PC ~/.ssh
```

```
$ pwd
```

```
/home/dhoward/.ssh
```

```
dhoward@dhoward-PC ~/.ssh
```

```
$ whoami
```

```
dhoward
```

```
dhoward@dhoward-PC ~/.ssh
```

```
$ ls -l
```

```
total 17
```

```
-rw----- 1 dhoward None 1679 Oct 11 22:08 id_rsa  
-rw-r--r-- 1 dhoward None 400 Oct 11 22:08 id_rsa.pub  
-rw-r--r-- 1 dhoward None 10448 Oct 11 23:33 known_hosts
```

# Linux commands for homework 1

\$ls -l  
\$ls -la  
\$sudo  
\$pwd  
\$whoami  
\$cat filename  
\$scp  
\$cp  
\$mv  
\$cd  
\$ssh  
\$ssh-keygen

- It is important to take the time to understand Linux commands for homeworks.

# Summary

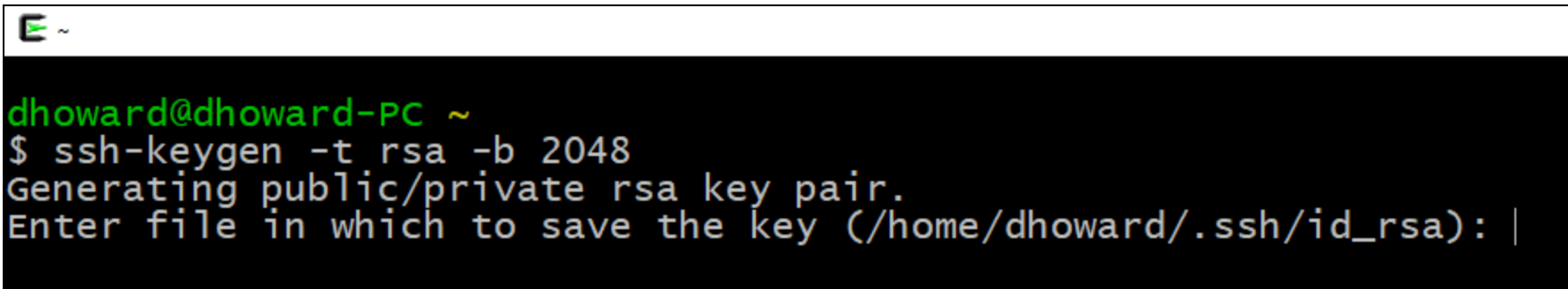
- You are using Cygwin or some other app from your laptop to connect to a remote Linux VM server.
- You use Linux Commands to work in your Linux VM.
- Security keys are important when connecting to remote cloud resources. Keys are saved locally as well as in the cloud for authentication. Never destroy your key files if you have VMs or resources dependent on them. You could always regenerate keys anytime and new cloud resources.



## II. GENERATE SSH KEY PAIR

# Generate an SSH Key Pair

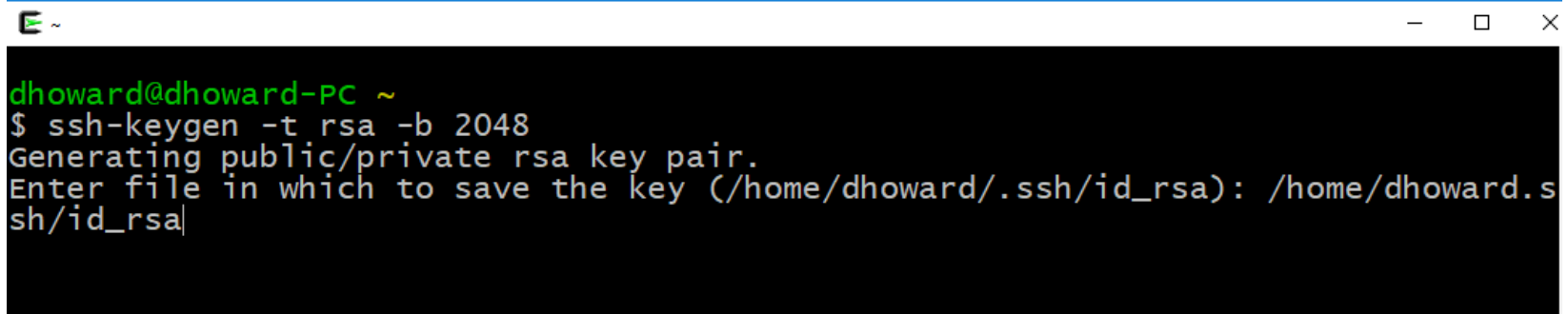
- Open your Cygwin terminal window and type:  
`$ssh-keygen -t rsa -b 2048`

A screenshot of a Cygwin terminal window. The title bar shows a green icon and a tilde symbol. The terminal content shows the user 'dhoward' at 'dhoward-PC' in the home directory. They have entered the command '\$ ssh-keygen -t rsa -b 2048'. The terminal output shows 'Generating public/private rsa key pair.' followed by a prompt 'Enter file in which to save the key (/home/dhoward/.ssh/id\_rsa):' with a cursor at the end of the line.

```
E ~  
dhoward@dhoward-PC ~  
$ ssh-keygen -t rsa -b 2048  
Generating public/private rsa key pair.  
Enter file in which to save the key (/home/dhoward/.ssh/id_rsa): |
```

# Generate an SSH Key Pair cont...

- You will then need to enter the file name to save the key. Enter it exactly as shown in your prompt. `/home/dhoward/.ssh/id_rsa`



```
dhoward@dhoward-PC ~  
$ ssh-keygen -t rsa -b 2048  
Generating public/private rsa key pair.  
Enter file in which to save the key (/home/dhoward/.ssh/id_rsa): /home/dhoward.s  
sh/id_rsa|
```

# Generate an SSH Key Pair cont...

- You will be asked to enter a passphrase.
- Click enter to leave it blank. Your SSH Key Pair is now created and saved in 2 files (a public and private key file).

```

dhoward@dhoward-PC ~
$ ssh-keygen -t rsa -b 2048
Generating public/private rsa key pair.
Enter file in which to save the key (/home/dhoward/.ssh/id_rsa): /home/dhoward/.ssh/id_rsa
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/dhoward/.ssh/id_rsa.
Your public key has been saved in /home/dhoward/.ssh/id_rsa.pub.
The key fingerprint is:
12:86:78:f3:3c:9c:cb:39:9f:96:62:3b:d2:15:5d:67 dhoward@dhoward-PC
The key's randomart image is:
+--[ RSA 2048 ]-----+
|
|      . .
|    . + o . . . o E
|   . * o . .
|     B S .
|    . = .
|   . = . .
|  . = oo .
| o . = o
|
+-----+

```

# Viewing the SSH Key Pair

- In Cygwin type the location where you stored your key.

Example:

`$cd /home/dhoward/.ssh`

- You can then view your two key files:

`$ ls -l`

```
dhoward@dhoward-PC ~
$ pwd
/home/dhoward

dhoward@dhoward-PC ~
$ pwd
/home/dhoward

dhoward@dhoward-PC ~
$ cd .ssh

dhoward@dhoward-PC ~/.ssh
$ ls -l
total 17
-rw----- 1 dhoward None 1679 Oct 11 22:08 id_rsa
-rw-r--r-- 1 dhoward None 400 Oct 11 22:08 id_rsa.pub
-rw-r--r-- 1 dhoward None 10273 Oct 4 00:40 known_hosts
```

# View your Public Key

- You can view your public key by typing  
`$cat id_rsa.pub`
- Select the entire public key and then right click and copy it

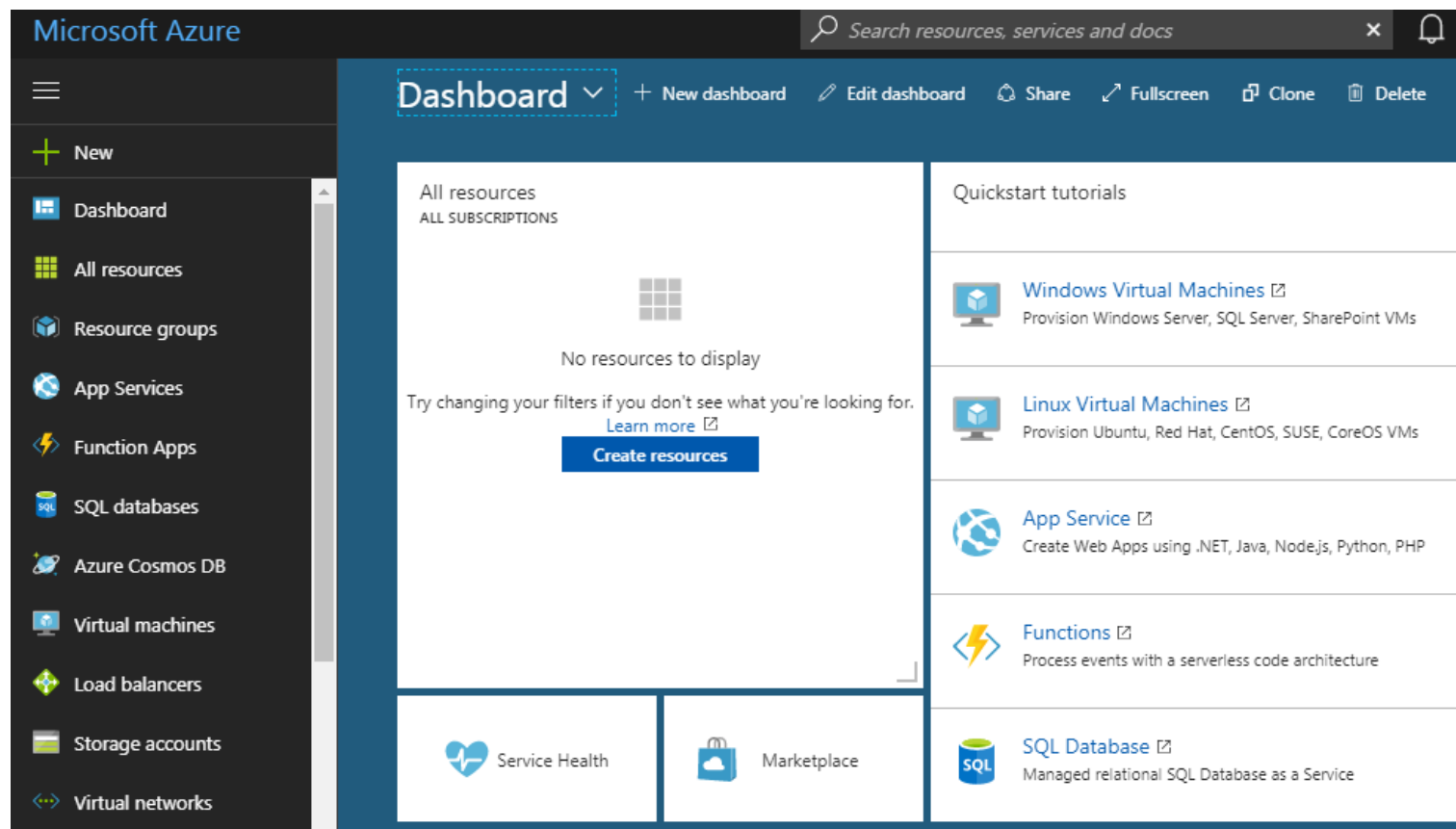
```
dhoward@dhoward-PC ~/.ssh
$ cat id_rsa.pub
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQCi rdabFqXMYeMJ8dTh7NqLzR+0IfMsNero
wiRW5U3t7dDCm7vEIZ7ANY9mhgMZ8GcYTdd1opjou5W1bGE1wiU1/FmiW6jbwz4piNvsUgv+
fnFEBjLoGF4RVdea1FG7KNIJ8+hZRSXj2ICzL9pXHIX410XQVQhrsug9JzU5H/tfFtvFA8zs
tAaa3Orvwnf3f1izD4Ss2vr1kauan1vOtVN7wiR14Wm1HK5O7O6iDaa8GU+dORaFOInMvQq0
M8sMdn3k
Bl1DXzH683LDodXuazK9 dhoward@dhoward-PC
```

Note: the name of your pc is here.

### III. CREATE A LINUX VM IN AZURE

# Create a new Linux Machine in the Dashboard

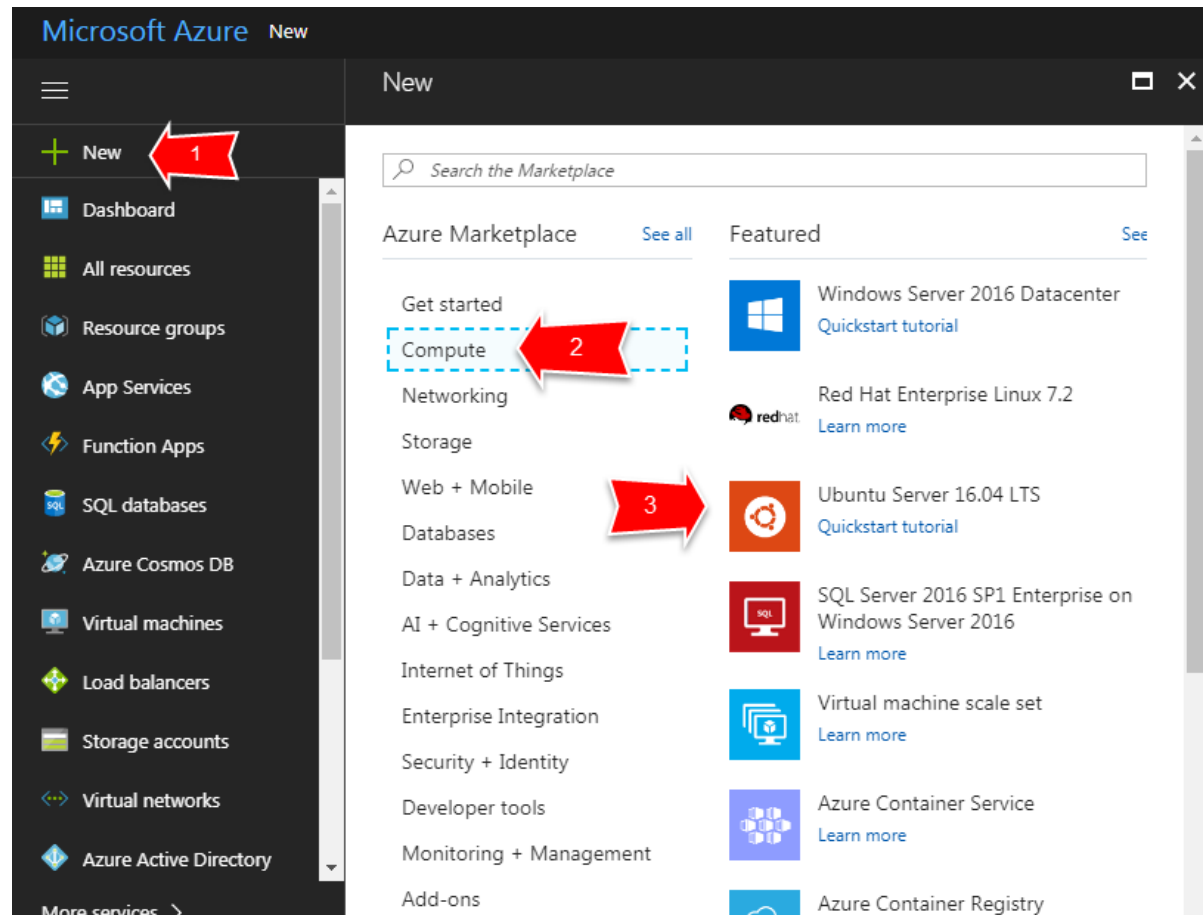
- Log in to your Azure account ([portal.azure.com](https://portal.azure.com)) and go to your Dashboard





# Create a new Linux Machine in the Dashboard

- Select 'NEW' on the left and then select 'Compute' and then select Ubuntu Server 16.04 LTS
- Note: If you want to learn more about Ubuntu there is a quickstart tutorial link you can also select.



# Add your SSH public key and VM Disk type

- Select HDD or SDD.
- You will need to enter your Public Key that you generated.

The screenshot shows the 'Create virtual machine' wizard in the Azure portal, specifically the 'Basics' tab. The left sidebar shows four steps: 1. Basics (selected), 2. Size, 3. Settings, and 4. Purchase. The main area contains the following fields:

- Name:** myBuntu (with a green checkmark)
- VM disk type:** HDD (selected from a dropdown)
- User name:** tourist (with a green checkmark)
- Authentication type:** SSH public key (selected from a dropdown)
- SSH public key:** ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQBAQChrGvdI5QbZrD1WQadNZMcJC (with a green checkmark)
- Subscription:** Free Trial (selected from a dropdown)
- Resource group:** myResourceGroup (with a green checkmark)

At the bottom right, there is a blue 'OK' button, which is highlighted with a red rectangular box.

# Select a Size for your VM

- Select a smaller VM size.

Create virtual machine > Choose a size

Create virtual machine

- 1 Basics Done
- 2 Size Choose virtual machine size
- 3 Settings Configure optional features
- 4 Purchase Ubuntu Server 16.04 LTS

Choose a size

Browse the available sizes and their features

Prices presented are estimates in your local currency that include only Azure infrastructure costs and any discounts for the subscription and location. The prices don't include any applicable software costs. Recommended sizes are determined by the publisher of the selected image based on hardware and software requirements.

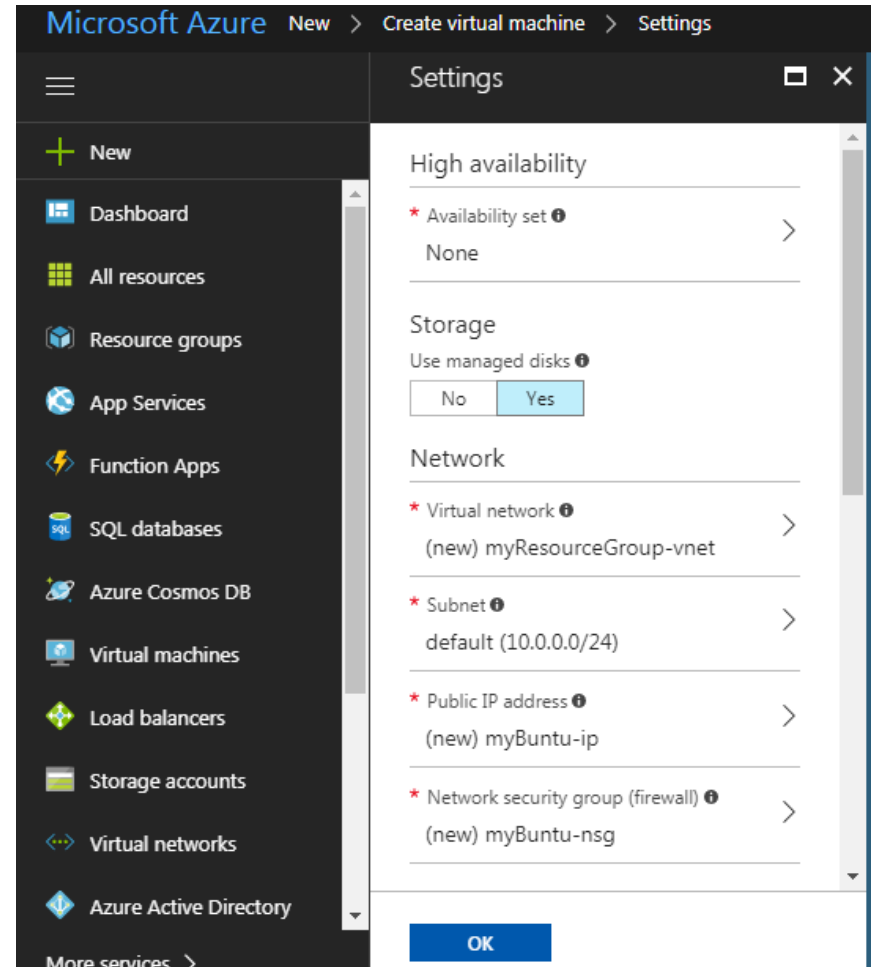
Supported disk type: HDD Minimum vCPUs: 1 Minimum memory (GiB): 0

D1_V2 Standard		D1 Standard		A1 Standard	
1	vCPU	1	vCPU	1	vCPU
3.5	GB	3.5	GB	1.75	GB
2 Data disks		2 Data disks		2 Data disks	
2x500 Max IOPS		2x500 Max IOPS		2x500 Max IOPS	
50 GB Local SSD		50 GB Local SSD		50 GB Local SSD	
Load balancing		Load balancing		Load balancing	

Select

# Continue with Default Settings

- You can keep the Default Settings and click 'ok'.



# 'Purchase' your new VM

- Note: you won't be charged...
- You will need to click 'Purchase' to create your VM.

**Create virtual machine** ✕ **Purchase** ☐ ✕

**1** Basics Done ✓

**2** Size Done ✓

**3** Settings Done ✓

**4** Purchase Ubuntu Server 16.04 LTS >

**Validation passed**

**Offer details**

**Ubuntu Server 16.04 LTS**  
by Canonical  
[Terms of use](#) | [privacy policy](#) [Pricing details](#)

**Standard A1**  
by Microsoft  
[Terms of use](#) | [privacy policy](#) **0.0600 USD/hr** [Pricing for other VM sizes](#)

**Azure resource**  
You may use your Azure monetary commitment funds or subscription credits for these

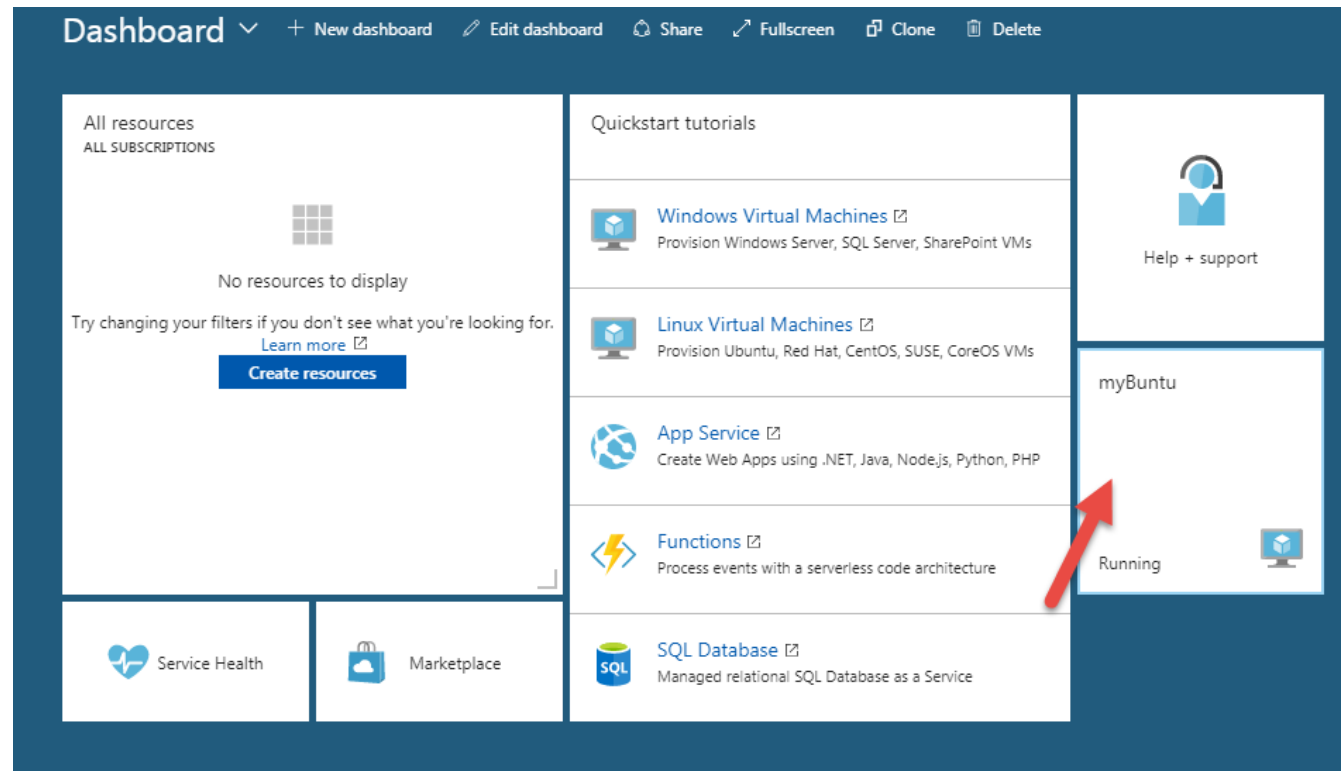
**Terms of use**

By clicking "Purchase", I (a) agree to the legal terms and privacy statement(s) associated with each Marketplace offering above, (b) authorize Microsoft to charge or bill my current payment method for the fees associated with my use of the offering(s), including applicable taxes, with the same billing frequency as my Azure subscription, until I discontinue use of the offering(s), (c)

**Purchase** [Download template and parameters](#)

# View your Linux Machine in the Dashboard

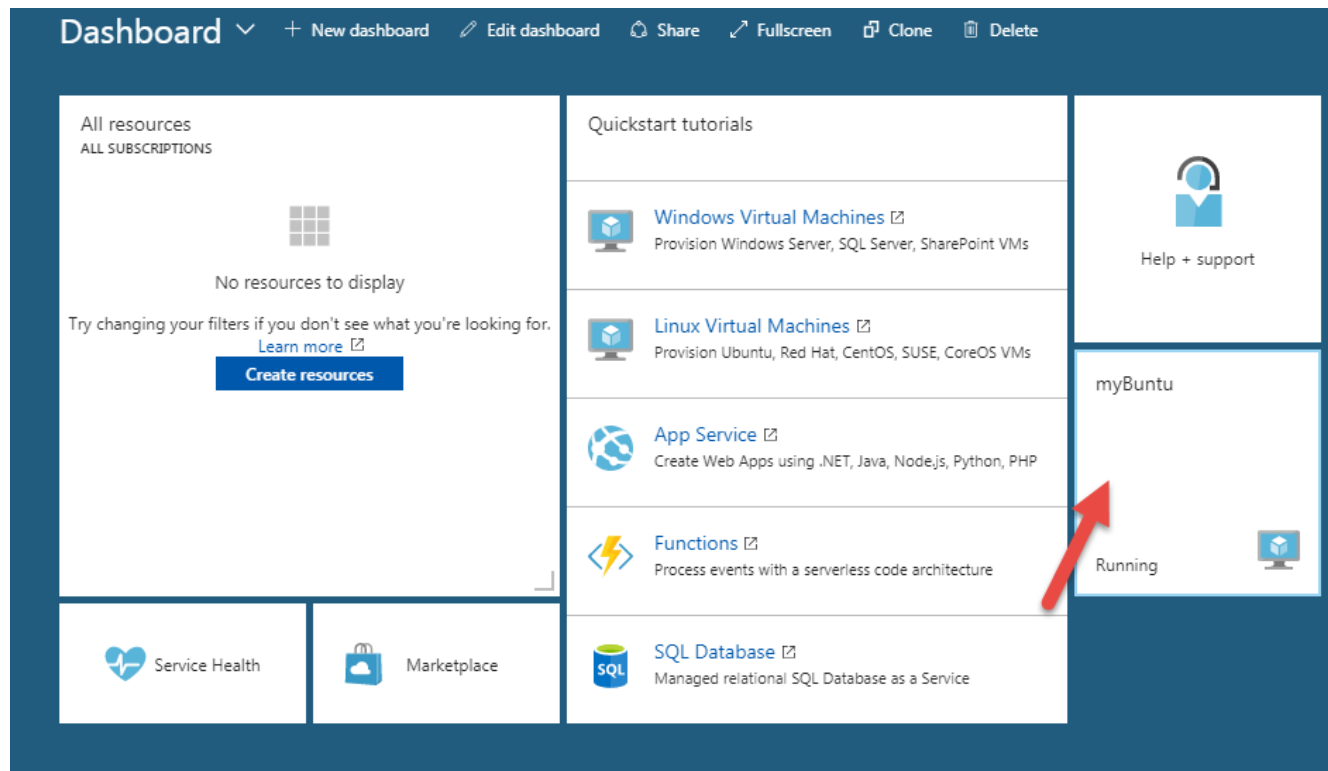
- Once the deployment is started, your new VM will show up as deploying and then running once it is ready.



## IV. CONNECT TO YOUR NEW LINUX MACHINE USING CYGWIN

# Select your VM

- On the Portal select your VM





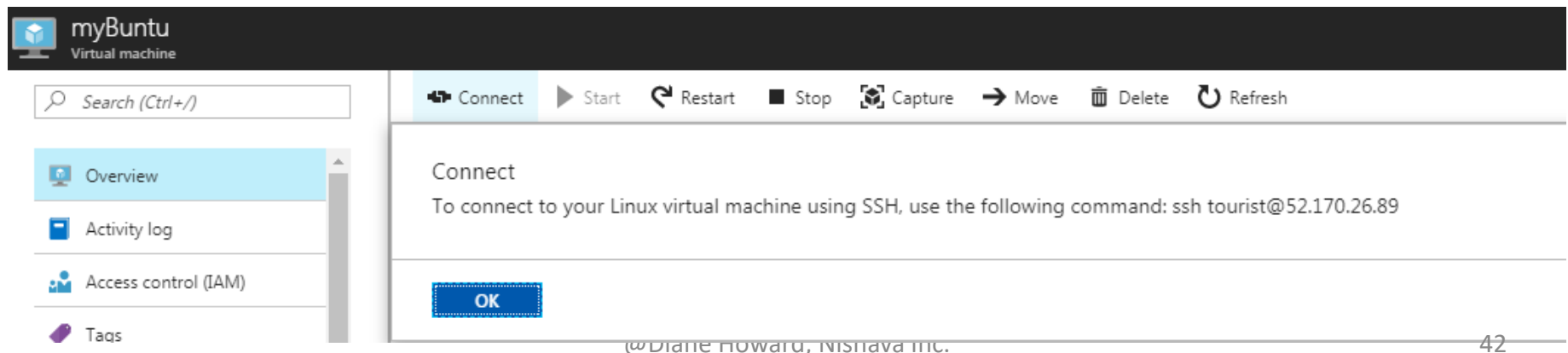
# Select Connect to obtain SSH

- Select the 'Connect' button for your VM to view the ssh connection string
- This is how we connect to the particular VM remotely in Cygwin.

The screenshot displays the Azure portal interface for a virtual machine named 'myBuntu'. The top toolbar includes buttons for 'Connect', 'Start', 'Restart', 'Stop', 'Capture', 'Move', 'Delete', and 'Refresh'. A red arrow highlights the 'Connect' button. The left sidebar contains navigation links: Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, and a SETTINGS section with Networking, Disks, Size, Extensions, Availability set, Configuration, and Properties. The main content area shows the VM's details, including its resource group, status, location, subscription, and public IP address. Below the details, there are two performance graphs: CPU (average) and Network (total), both showing data for the last 1 hour.

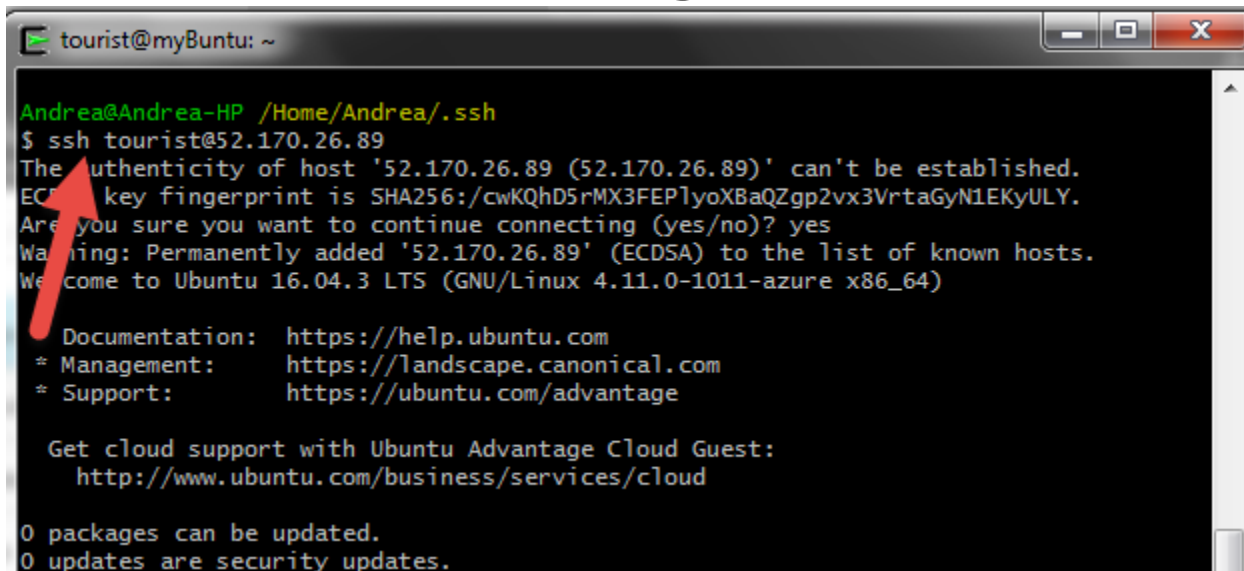
# Copy your SSH

- A dialog box will pop up with your connection address
- Ex: mine is ssh [tourist@52.170.26.89](ssh://tourist@52.170.26.89)
- Yours will have different numbers as this is your public ip address of your machine



# Connect to your VM from Cygwin

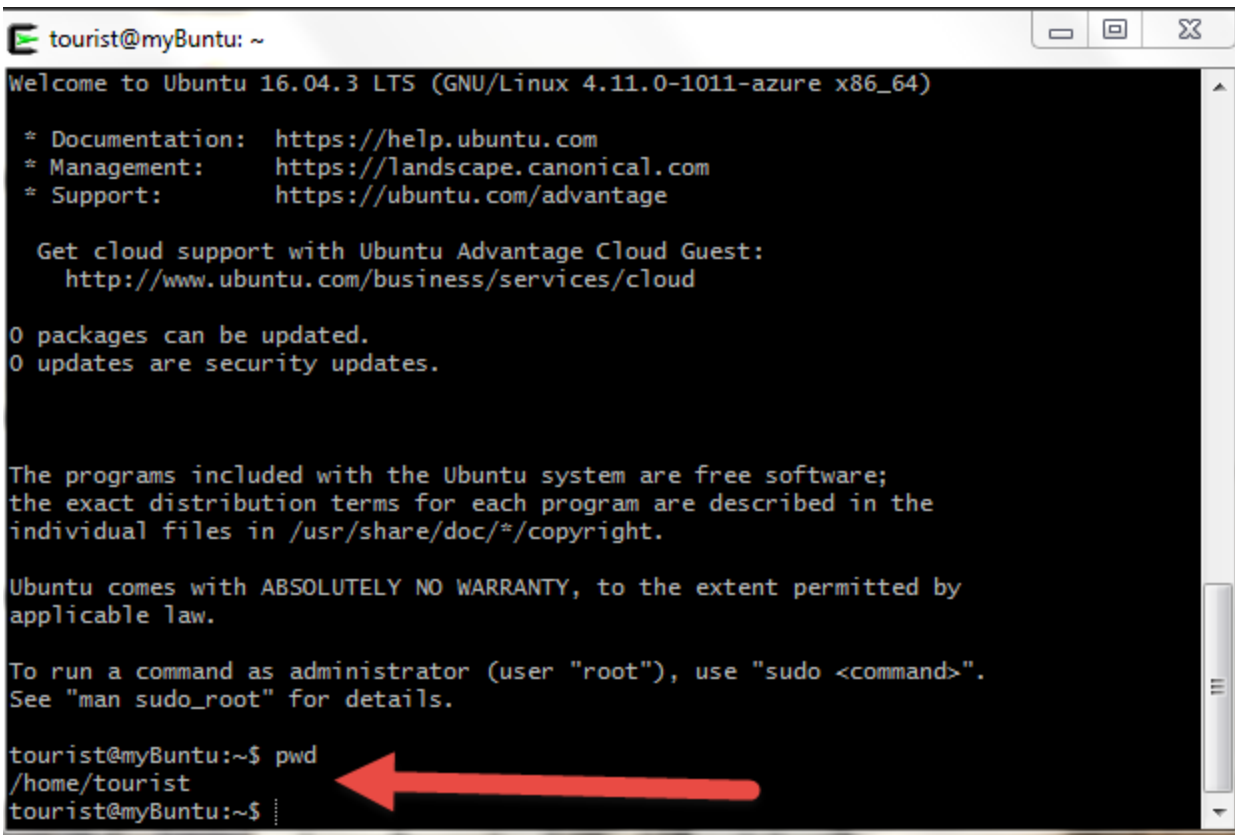
- Go to Cygwin and type your new connection address in
- Ex: mine is ssh [tourist@52.170.26.89](ssh:tourist@52.170.26.89)
- Type yes when you are asked if you would like to continue connecting.



```
tourist@myBuntu: ~  
Andrea@Andrea-HP /Home/Andrea/.ssh  
$ ssh tourist@52.170.26.89  
The authenticity of host '52.170.26.89 (52.170.26.89)' can't be established.  
ECDSA key fingerprint is SHA256:/cwKQhD5rMX3FEPlYoXBaQZgp2vx3VrtaGyN1EKyULY.  
Are you sure you want to continue connecting (yes/no)? yes  
Warning: Permanently added '52.170.26.89' (ECDSA) to the list of known hosts.  
Welcome to Ubuntu 16.04.3 LTS (GNU/Linux 4.11.0-1011-azure x86_64)  
  
Documentation:  https://help.ubuntu.com  
* Management:  https://landscape.canonical.com  
* Support:     https://ubuntu.com/advantage  
  
Get cloud support with Ubuntu Advantage Cloud Guest:  
http://www.ubuntu.com/business/services/cloud  
  
0 packages can be updated.  
0 updates are security updates.
```

# Connect to your VM

- You are in your VM if you see Welcome to Ubuntu !
- Type `pwd` to see the path of the directory that you are now in.



```
tourist@myBuntu: ~  
Welcome to Ubuntu 16.04.3 LTS (GNU/Linux 4.11.0-1011-azure x86_64)  
  
* Documentation:  https://help.ubuntu.com  
* Management:    https://landscape.canonical.com  
* Support:        https://ubuntu.com/advantage  
  
Get cCloud support with Ubuntu Advantage Cloud Guest:  
http://www.ubuntu.com/business/services/cloud  
  
0 packages can be updated.  
0 updates are security updates.  
  
The programs included with the Ubuntu system are free software;  
the exact distribution terms for each program are described in the  
individual files in /usr/share/doc/*/copyright.  
  
Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by  
applicable law.  
  
To run a command as administrator (user "root"), use "sudo <command>".  
See "man sudo_root" for details.  
  
tourist@myBuntu:~$ pwd  
/home/tourist  
tourist@myBuntu:~$
```

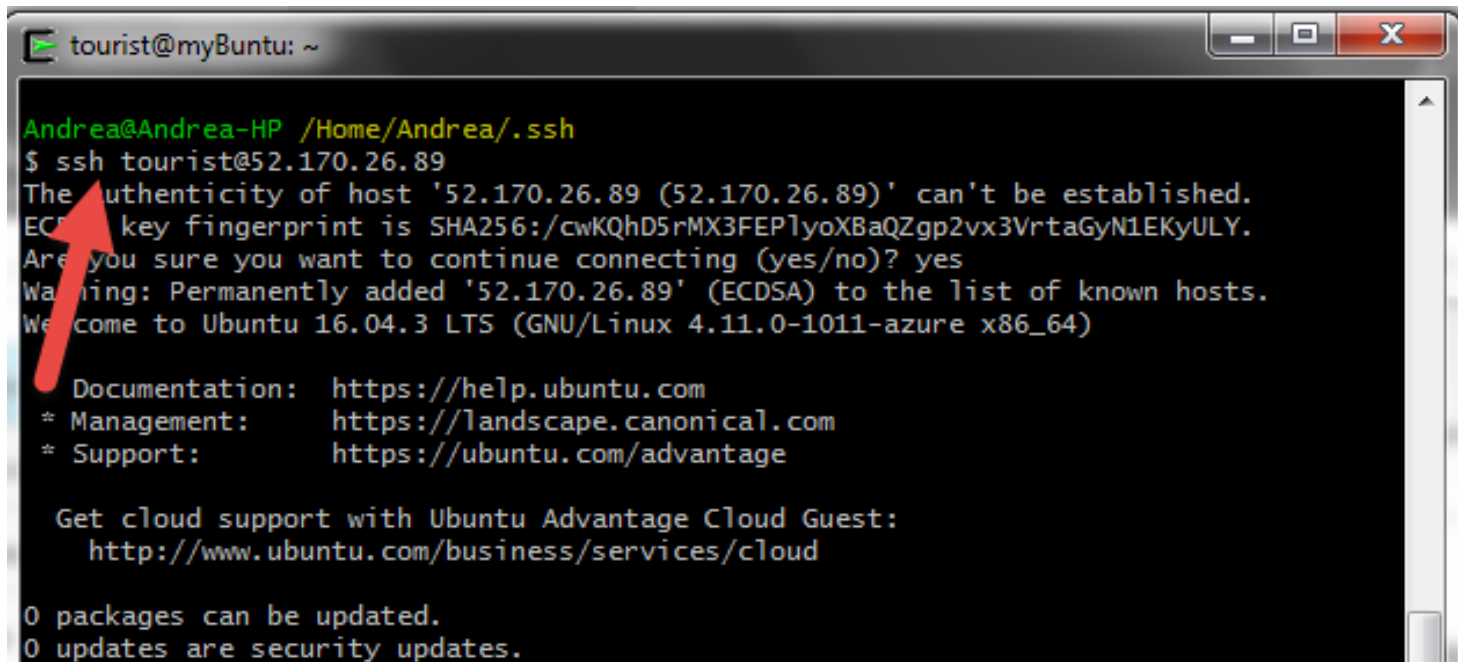
A red arrow points to the output of the `pwd` command, which is `/home/tourist`.

- You could update your Linux RedHat Packages but it is not necessary now for this example.  
`$sudo yum -y update`

# INSTALL APACHE TO YOUR LINUX VM

# Install Apache

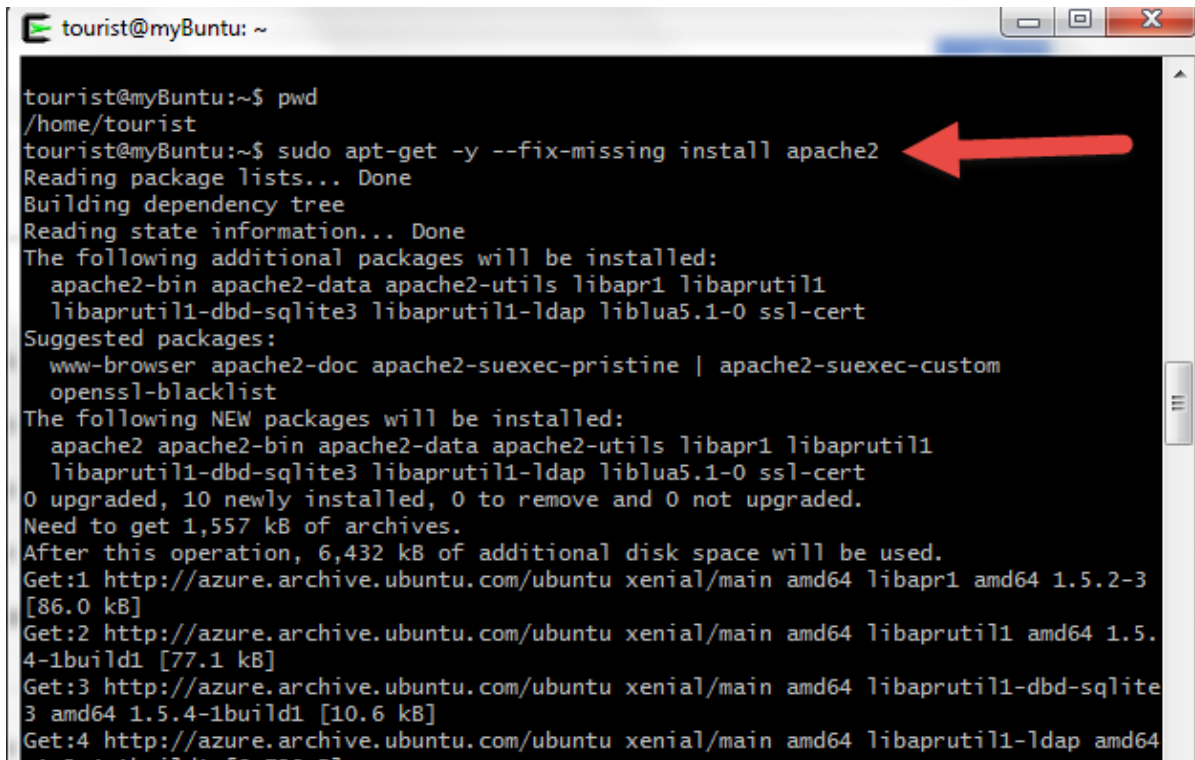
- You will download Apache in Cygwin to your new Linux host.
- Make sure you are still connected to your VM. If you are not follow steps in previous slides to reconnect by typing your connection address (ex. `ssh tourist@52.170.26.89` )



```
tourist@myBuntu: ~  
Andrea@Andrea-HP /Home/Andrea/.ssh  
$ ssh tourist@52.170.26.89  
The authenticity of host '52.170.26.89 (52.170.26.89)' can't be established.  
ECDSA key fingerprint is SHA256:/cwKQhD5rMX3FEPlYoXBaQZgp2vx3VrtaGyN1EKyULY.  
Are you sure you want to continue connecting (yes/no)? yes  
Warning: Permanently added '52.170.26.89' (ECDSA) to the list of known hosts.  
Welcome to Ubuntu 16.04.3 LTS (GNU/Linux 4.11.0-1011-azure x86_64)  
  
Documentation:  https://help.ubuntu.com  
* Management:   https://landscape.canonical.com  
* Support:      https://ubuntu.com/advantage  
  
Get cloud support with Ubuntu Advantage Cloud Guest:  
http://www.ubuntu.com/business/services/cloud  
  
0 packages can be updated.  
0 updates are security updates.
```

# Install Apache

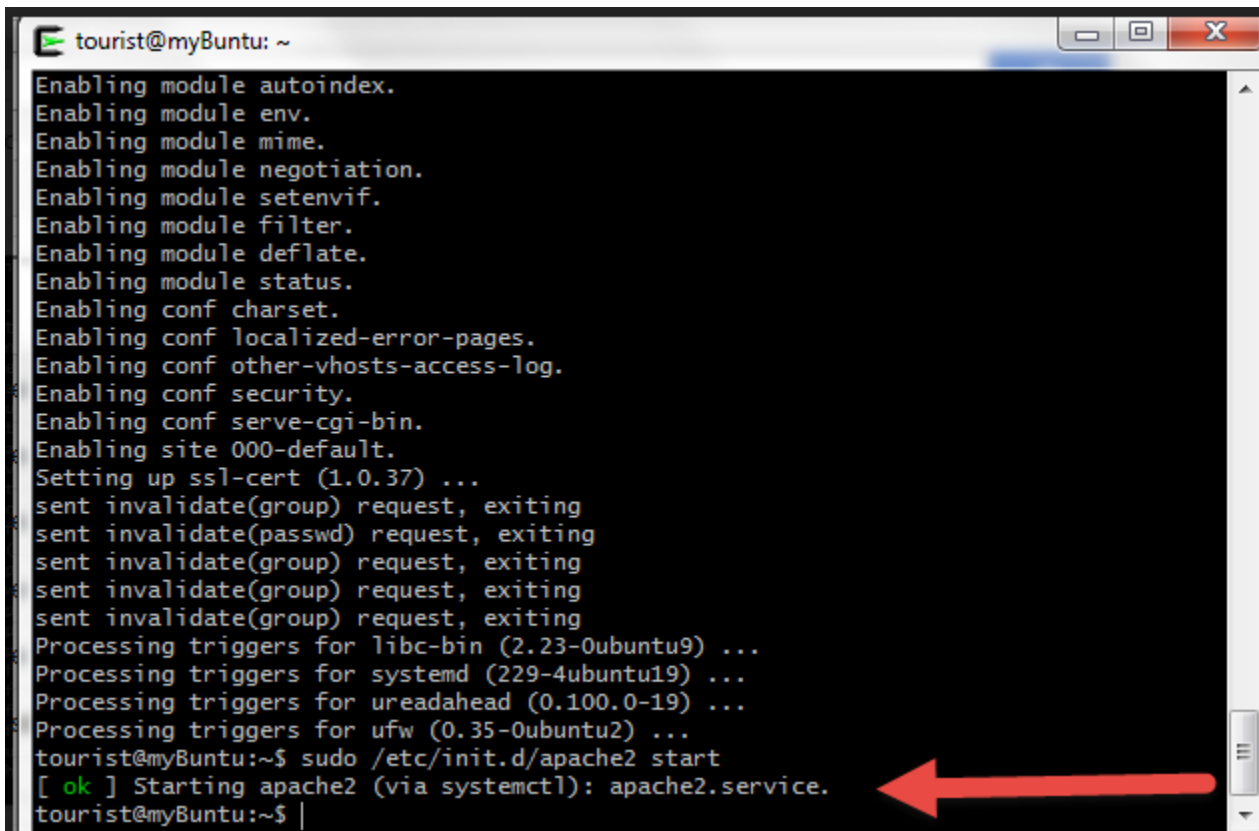
- Install Apache on Cygwin by typing the following on your Cygwin command prompt:
- `$sudo apt-get -y --fix-missing install apache2`



```
tourist@myBuntu: ~  
tourist@myBuntu:~$ pwd  
/home/tourist  
tourist@myBuntu:~$ sudo apt-get -y --fix-missing install apache2  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
The following additional packages will be installed:  
  apache2-bin apache2-data apache2-utils libapr1 libaprutil1  
  libaprutil1-dbd-sqlite3 libaprutil1-ldap liblua5.1-0 ssl-cert  
Suggested packages:  
  www-browser apache2-doc apache2-suexec-pristine | apache2-suexec-custom  
  openssl-blacklist  
The following NEW packages will be installed:  
  apache2 apache2-bin apache2-data apache2-utils libapr1 libaprutil1  
  libaprutil1-dbd-sqlite3 libaprutil1-ldap liblua5.1-0 ssl-cert  
0 upgraded, 10 newly installed, 0 to remove and 0 not upgraded.  
Need to get 1,557 kB of archives.  
After this operation, 6,432 kB of additional disk space will be used.  
Get:1 http://azure.archive.ubuntu.com/ubuntu xenial/main amd64 libapr1 amd64 1.5.2-3  
[86.0 kB]  
Get:2 http://azure.archive.ubuntu.com/ubuntu xenial/main amd64 libaprutil1 amd64 1.5.  
4-1build1 [77.1 kB]  
Get:3 http://azure.archive.ubuntu.com/ubuntu xenial/main amd64 libaprutil1-dbd-sqlite  
3 amd64 1.5.4-1build1 [10.6 kB]  
Get:4 http://azure.archive.ubuntu.com/ubuntu xenial/main amd64 libaprutil1-ldap amd64
```

# Start Apache

- Start Apache on Cygwin by typing the following in your Cygwin command prompt:  
`$sudo /etc/init.d/apache2 start`

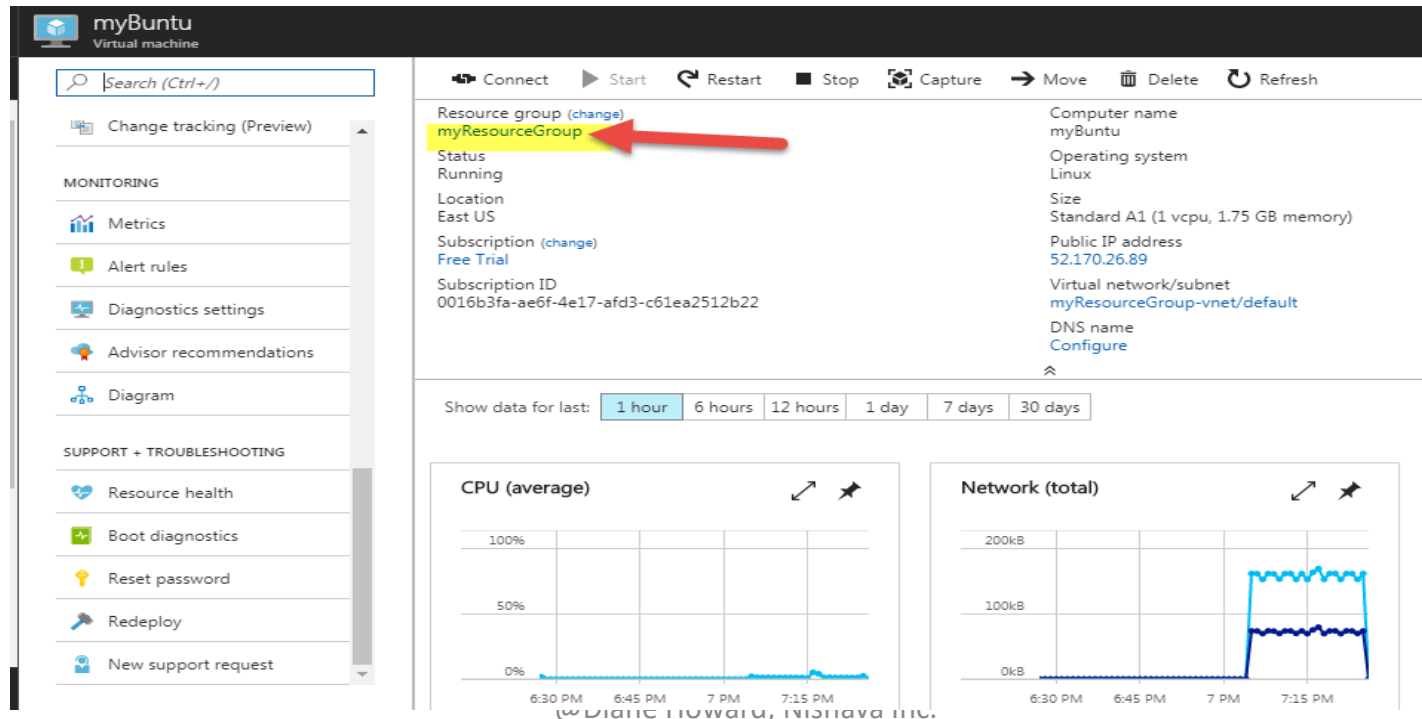


```
tourist@myBuntu: ~  
Enabling module autoindex.  
Enabling module env.  
Enabling module mime.  
Enabling module negotiation.  
Enabling module setenvif.  
Enabling module filter.  
Enabling module deflate.  
Enabling module status.  
Enabling conf charset.  
Enabling conf localized-error-pages.  
Enabling conf other-vhosts-access-log.  
Enabling conf security.  
Enabling conf serve-cgi-bin.  
Enabling site 000-default.  
Setting up ssl-cert (1.0.37) ...  
sent invalidate(group) request, exiting  
sent invalidate(passwd) request, exiting  
sent invalidate(group) request, exiting  
sent invalidate(group) request, exiting  
sent invalidate(group) request, exiting  
Processing triggers for libc-bin (2.23-0ubuntu9) ...  
Processing triggers for systemd (229-4ubuntu19) ...  
Processing triggers for ureadahead (0.100.0-19) ...  
Processing triggers for ufw (0.35-0ubuntu2) ...  
tourist@myBuntu:~$ sudo /etc/init.d/apache2 start  
[ ok ] Starting apache2 (via systemctl): apache2.service.  
tourist@myBuntu:~$
```



# Details of your Linux Vm

- This page shows the details of your new Linux VM.
- Because this VM now hosts a webserver (from our Apache install), a Network Security Group (NSG) “rule” needs to be created for port 80 in your resource group to access the home page from your browser.



# Select the Network Security group

- Locate the Network Security Group noted in the type column

myResourceGroup  
Resource group

Search (Ctrl+/)

Overview

Activity log

Access control (IAM)

Tags

SETTINGS

Quickstart

Resource costs

Deployments

Policies

Properties

Locks

Automation script

+ Add Assign Tags Columns Delete resource group Refresh Move

Essentials ^

Subscription name (change) [Free Trial](#) Deployments [1 Succeeded](#)

Subscription ID  
0016b3fa-ae6f-4e17-afd3-c61ea2512b22

Filter by name... All types All locations

7 items

<input type="checkbox"/>	NAME ↑↓	TYPE ↑↓	LOCATION
<input type="checkbox"/>	myBuntu	Virtual machine	East US
<input type="checkbox"/>	myBuntu_OsDisk_1_8ac0cec8c068479e95c2e10f576fbc60	Disk	East US
<input type="checkbox"/>	mybuntu237	Network interface	East US
<input type="checkbox"/>	myBuntu-ip	Public IP address	East US
<input type="checkbox"/>	myBuntu-nsg	Network security group	East US
<input type="checkbox"/>	myResourceGroup-vnet	Virtual network	East US
<input type="checkbox"/>	shutdown-computevm-myBuntu	Microsoft.DevTestLab/schedules	East US 50

# Select 'Inbound security rules'

- This page shows details of the Network security group Inbound & Output rules
- We will need to change the Inbound traffic rule

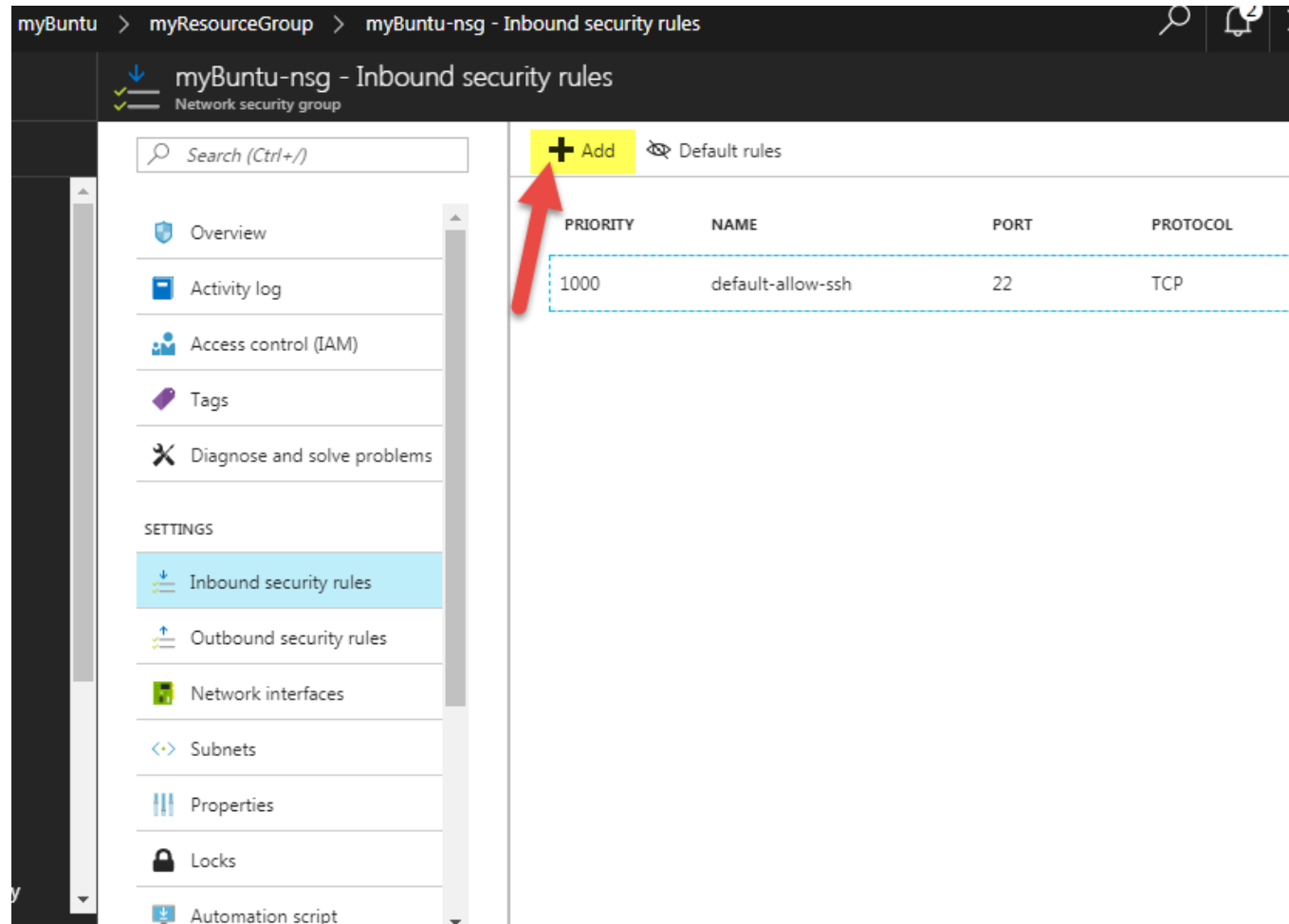
The screenshot displays the Azure portal interface for a Network Security Group (NSG) named 'myBuntu-nsg'. The left-hand navigation pane shows various settings, with 'Inbound security rules' highlighted in yellow and pointed to by a red arrow. The main content area shows the details of the NSG, including its resource group, location, and subscription. Below this, there are two sections: 'Inbound security rules' and 'Outbound security rules'. The 'Inbound security rules' section contains a table with one rule, 'default-allow-ssh', which has a priority of 1000, allows traffic on port 22 using the TCP protocol from any source. The 'Outbound security rules' section is currently empty, showing 'No results'.

PRIORITY	NAME	PORT	PROTOCOL	SOURCE
1000	default-allow-ssh	22	TCP	Any

PRIORITY	NAME	PORT	PROTOCOL	SOURCE
No results.				

# Select 'Add'

- Add a new inbound port rule to reach our Linux Vm



myBuntu > myResourceGroup > myBuntu-nsg - Inbound security rules

myBuntu-nsg - Inbound security rules  
Network security group

Search (Ctrl+/)

+ Add Default rules

PRIORITY	NAME	PORT	PROTOCOL
1000	default-allow-ssh	22	TCP

Overview  
Activity log  
Access control (IAM)  
Tags  
Diagnose and solve problems

SETTINGS

- Inbound security rules
- Outbound security rules
- Network interfaces
- Subnets
- Properties
- Locks
- Automation script

# Add Port 80 to Destination port ranges

- In the destination port put: 80
- Make sure the action is set to “Allow”
- Add the Name as: http
- Then select ‘ok’

myBuntu > myResourceGroup > myBuntu-nsg - Inbound security rules > Add inbound security rule

### Add inbound security rule

myBuntu-nsg

Basic

\* Source ⓘ  
Any

\* Source port ranges ⓘ  
\*

\* Destination ⓘ  
Any

\* Destination port ranges ⓘ  
80 ✓

\* Protocol  
Any TCP UDP

\* Action  
Allow Deny

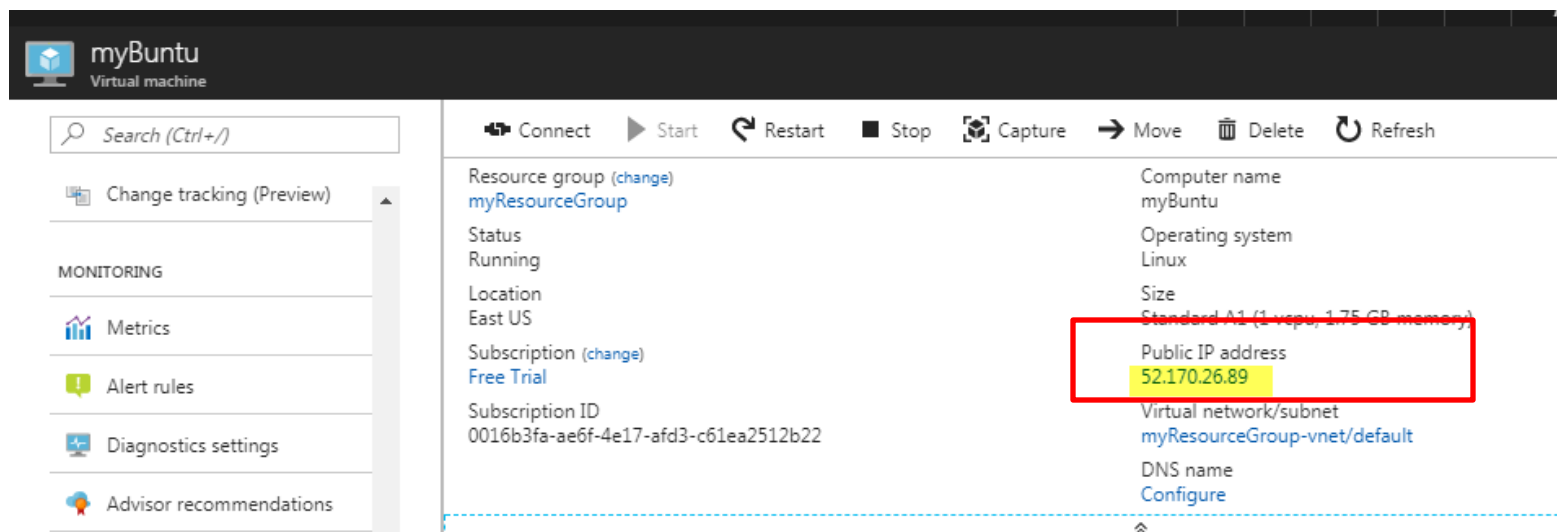
\* Priority ⓘ  
100

\* Name  
http ✓

OK

# Test it out!

- Test reaching Apache on the web all due to port 80 allowing access to your VM home page!
- Go to your browser and type in your public IP Address (ex. Mine is 52.170.26.89) – this can be found on the first page of your VM. You can also find behavior of your VM here.



The screenshot displays the Azure portal interface for a virtual machine named 'myBuntu'. The left sidebar shows navigation options like 'Change tracking (Preview)', 'MONITORING', 'Metrics', 'Alert rules', 'Diagnostics settings', and 'Advisor recommendations'. The main area shows the VM's status as 'Running' and its location as 'East US'. A red box highlights the 'Public IP address' field, which contains the value '52.170.26.89'. Other details visible include the resource group 'myResourceGroup', subscription 'Free Trial', and the virtual network/subnet 'myResourceGroup-vnet/default'.

Property	Value
Resource group	myResourceGroup
Status	Running
Location	East US
Subscription	Free Trial
Subscription ID	0016b3fa-ae6f-4e17-afd3-c61ea2512b22
Computer name	myBuntu
Operating system	Linux
Size	Standard A1 (1 vcpu, 1.75 GB memory)
Public IP address	52.170.26.89
Virtual network/subnet	myResourceGroup-vnet/default
DNS name	Configure

# Test it out!

- Go to your browser and type in your public IP address

ne design and de W Add to List

Computer name  
myBuntu  
Operating system  
Linux  
Size  
Standard A1 (1 vcpu, 1.75 GB memory)  
Public IP address  
52.170.26.89  
Virtual network/subnet  
myResourceGroup-vnet/default  
DNS name  
Configure

## Apache2 Ubuntu

### 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.

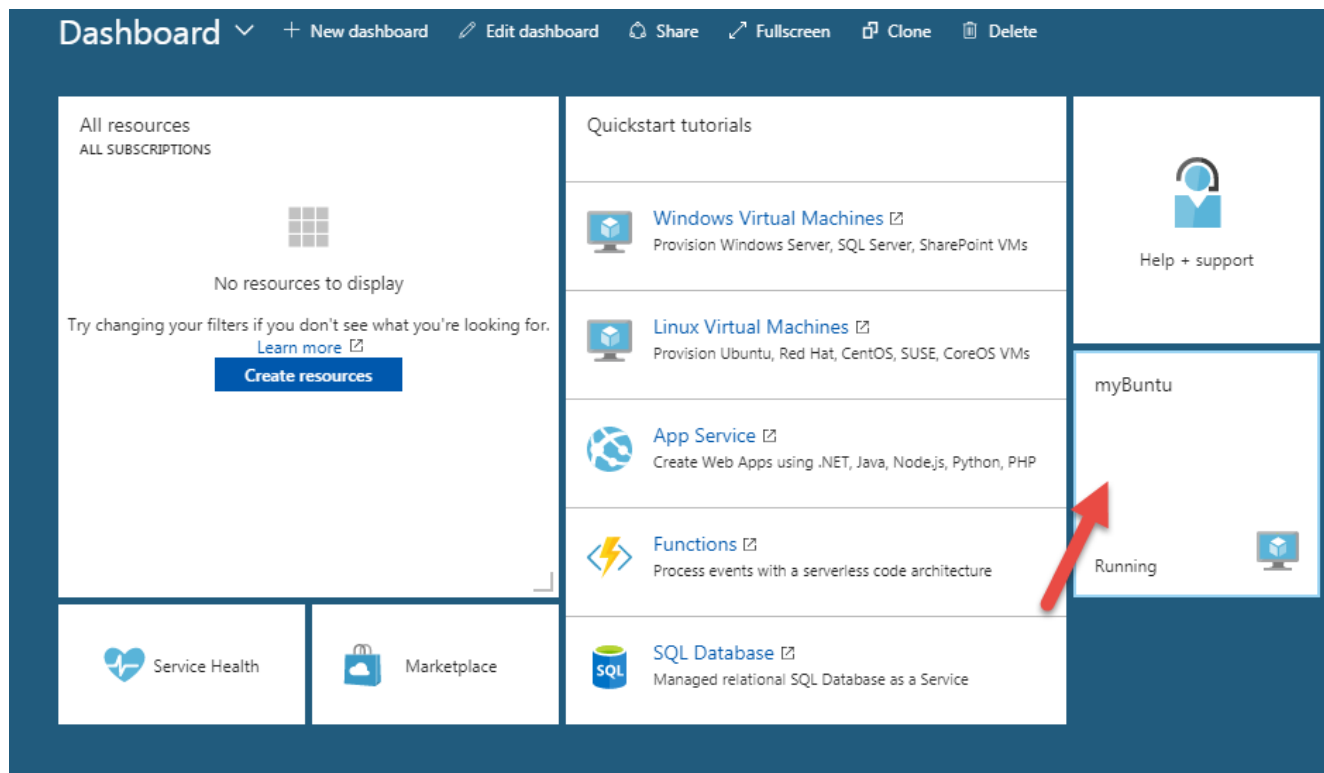
#### Configuration Overview

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:

# Delete your VM and Resource Group

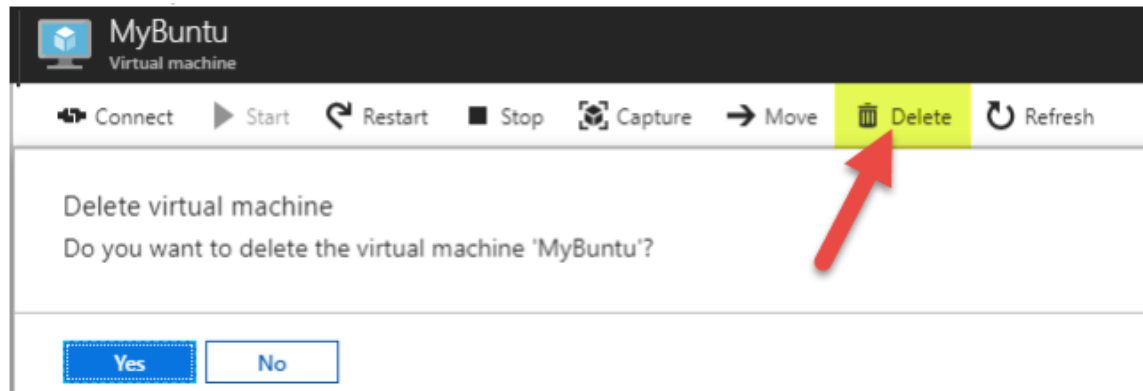
- Once you are done you delete your VM and Resource Group to avoid getting charged for keeping them running.
- Select your VM from your Portal.





# Delete your VM

- Select 'Delete' and then select 'Yes' to remove your VM.



# Delete your Resource Group

- In your portal select the myResourceGroup-vnet

The screenshot shows the Azure portal dashboard. At the top, there's a navigation bar with 'Dashboard' and several action buttons: '+ New dashboard', 'Edit dashboard', 'Share', 'Fullscreen', 'Clone', and 'Delete'. Below this, the dashboard is divided into several sections. On the left, under 'All resources ALL SUBSCRIPTIONS', there's a list of resources. The resource 'myResourceGroup-vnet' is highlighted in yellow. To the right of this list is a 'Refresh' button. In the center, there's a 'Quickstart tutorials' section with links for 'Windows Virtual Machines', 'Linux Virtual Machines', 'App Service', 'Functions', and 'SQL Database'. On the right side, there's a 'Help + support' section with a headset icon, and a 'myBuntu' section with a 'Running' status and a monitor icon. At the bottom left, there are 'Service Health' and 'Marketplace' tiles. At the bottom right, there's a 'SQL Database' tile.

All resources ALL SUBSCRIPTIONS	
myBuntu-ip	Public IP address
myBuntu	Virtual machine
myBuntu_OsDisk_1_8ac0cec8c...	Disk
mybuntu237	Network interface
myBuntu-nsg	Network security gro...
myResourceGroup-vnet	Virtual network
shutdown-computevm-myBun...	

Quickstart tutorials	
	<a href="#">Windows Virtual Machines</a> Provision Windows Server, SQL Server, SharePoint VMs
	<a href="#">Linux Virtual Machines</a> Provision Ubuntu, Red Hat, CentOS, SUSE, CoreOS VMs
	<a href="#">App Service</a> Create Web Apps using .NET, Java, Node.js, Python, PHP
	<a href="#">Functions</a> Process events with a serverless code architecture
	<a href="#">SQL Database</a> Managed relational SQL Database as a Service

Help + support

myBuntu

Running

Service Health

Marketplace

# Delete your Resource Group

- Once in your virtual network, select 'myResourceGroup'. You could reuse Resource Groups if you prefer and not delete them.

myResourceGroup-vnet  
Virtual network

Search (Ctrl+/)

Overview

Activity log

Access control (IAM)

Tags

SETTINGS

Address space

Connected devices

Subnets

DNS servers

Peerings

Service endpoints (Preview)

Properties

Locks

Move Delete

Resource group (change)  
**myResourceGroup**

Location  
East US

Subscription (change)  
Free Trial

Subscription ID  
0016b3fa-ae6f-4e17-afd3-c61ea2512b22

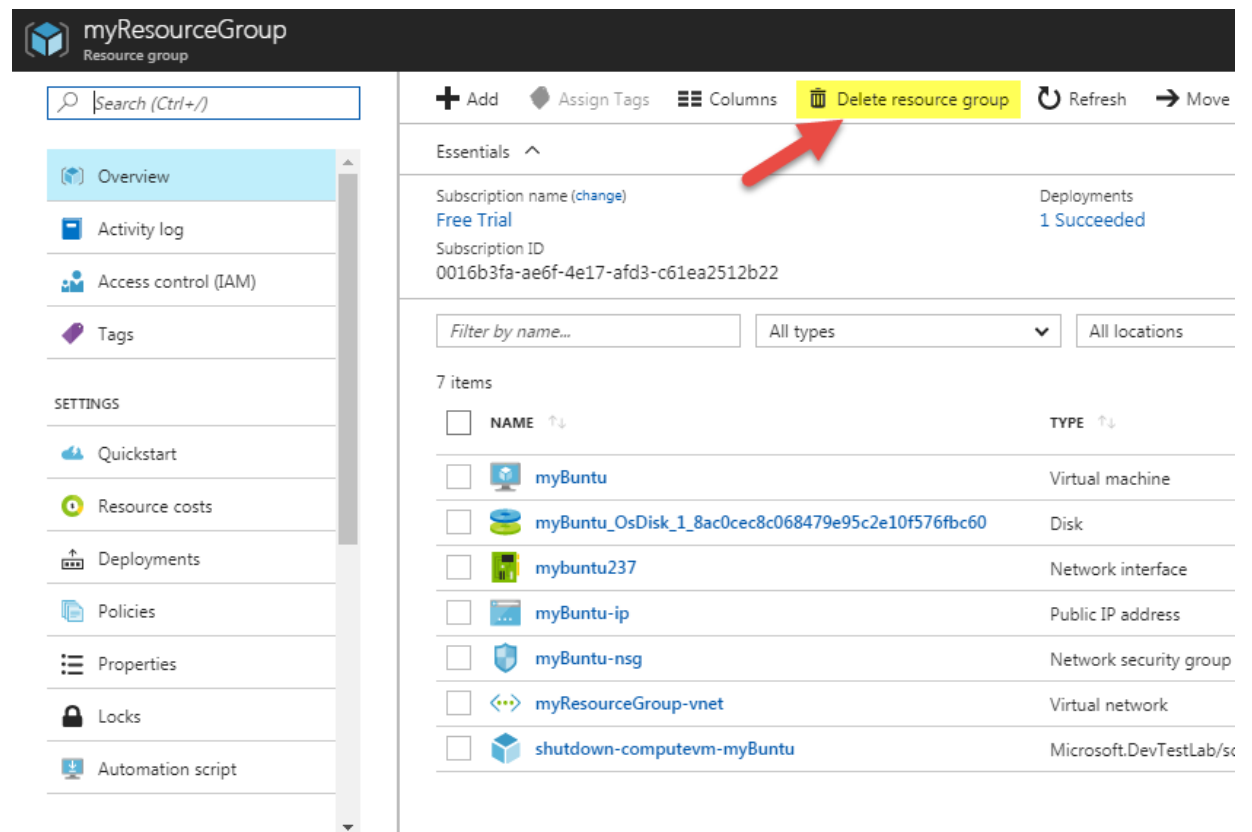
Connected devices

Search connected devices

DEVICE	TYPE
mybuntu237	Network interface

# Delete your Resource Group

- Finally, select 'delete resource group' to delete your Resource Group



The screenshot shows the Azure portal interface for a resource group named 'myResourceGroup'. The left sidebar contains navigation links for Overview, Activity log, Access control (IAM), Tags, and various settings. The main content area displays the 'Delete resource group' button, which is highlighted with a red arrow. Below this, there is a table of resources within the group, including a virtual machine, disk, network interface, public IP address, network security group, virtual network, and a Microsoft.DevTestLab resource.

NAME	TYPE
myBuntu	Virtual machine
myBuntu_OsDisk_1_8ac0cec8c068479e95c2e10f576fbc60	Disk
mybuntu237	Network interface
myBuntu-ip	Public IP address
myBuntu-nsg	Network security group
myResourceGroup-vnet	Virtual network
shutdown-computevm-myBuntu	Microsoft.DevTestLab/sc