



Imaging computers using Windows Deployment Server and
vSphere

Contents:

1. Introduction
2. Setup for the base image
3. Updating and building the image
4. Drivers for machines
5. Adding machines to Active Directory
6. Things to check before re-imaging
7. How to image a computer from start to finish
8. Device-specific configurations

1. Introduction

This guide was written to explain how to use the system in place for imaging QMC owned computers. This will go into some detail on how it's configured, and why it's configured in the way that it is. This guide assumes that you have a basic understanding of imaging Microsoft Windows. This guide should be used as a reference for you when creating the Golden Image, making changes to the Golden Image or imaging devices. The process for imaging windows is constantly changing as the needs of users change, and as Microsoft releases new builds of Windows 10 with new features which the school can benefit from.

Gather resources

- Obtain the current drivers
- Download the latest apps
- Ensure you have the most stable and up to date version of Windows ISO



Create Golden Image, then export wim

- Install Windows OS on a VM
- Install all apps, Windows Updates, and make all customizations
- Sysprep Windows to get your custom WIM file
- Capture the image



Import WIM file to WDS

- Transfer WIM to QMCWDS001 D:\
- Import drivers and WIM into WDS
- Add the image to WDS



Deploy to PC

- Tell WDS where the PC goes in AD and what its name is
- WDS installs the custom image and injects defined drivers

2. Setup for the base image

- Open [vSphere](#) and log in with “qmc.local\username” and your password .
- Go into the “Win10-GoldenImage” which will be at the bottom of the list of machines available.
- Make sure there are enough resources (CPU, RAM) allocated to allow windows to install at a relatively quick pace.
- Delete the drive and add a new one to start fresh, making sure to have enough space for windows and apps. 50gb recommended. You will need another drive for the capture, so allocate another 50gb drive for this.
- Clear the snapshot so that you have a clear list to add a snapshot that will be taken later. Snapshotting is important but will be explained later.
- Select the iso you wish to add and add it via the disk drive in the VM.
- Boot the VM from the disk drive to begin the windows install.
- Install windows with the default language as US, time zone as NZ and keyboard is US.
- The OS should be windows 10 Enterprise.
- Install windows only.
- Install on the drive that you added to the VM that should be empty, as it was a “new” drive.
- It should now start the install.
- When you can, select New Zealand
- Keyboard should be set to US, don’t worry about secondary keyboard layout
- The install will now continue
- At the welcome screen, press **Control + Shift + F3** to get into audit mode.

You will now be able to begin performing windows updates, security updates and installing the list of applications and extras that are required for the image.

3. Updating and building the image

The head of E-learning (at time of writing is Richard Knuckey) is responsible for what software the teachers and students use for learning. Richard has polled teaching staff to see what apps they need, and what applications the students need. The students' needs are covered in the Master App Matrix spreadsheet as they have installers made available on the intranet, the school's I.T does not install this for them or include them all in the build. You can find the Master App Matrix in the Documentation share on QMCSTF001. A number of staff have programs they install themselves. Some IB teachers get IB software direct to them.

There is only one list of apps for all computers deployed. Some departments need other software but manage this themselves. There is a folder (link highlighted below) with each of the apps contained in an ISO. They're kept as a sort of shortcut for times you may try building the image more than once. It's also handy to keep a copy of what you download in case the download is no longer available.

The location for the image apps is: [\\qmcwds001\d\\$\Shared\Administrators\Build files and installers\ Image apps](#)

This is the current set. It should be updated as the image changes to suit school needs:

1. First, run the "remove apps TS" command to remove universal apps (reboot after)
2. .Net framework v3.5 (via cmd & iso) (reboot after) – enable this as well
3. Audacity
4. Lame MP3 codec for Audacity
5. Bamboo tablet driver
6. Ccleaner
7. CCMP
8. DVD Region+CSS Free Lite
9. Easy interactive
10. Ffmpeg Codec for Audacity
11. GIMP (reboot after)
12. Google Chrome (enterprise MSI)
13. Handbrake
14. Inkscape (reboot after)
15. Laserworks
16. LEGO Mindstorms (reboot after)
17. Logger pro (reboot after)
18. Minecraft for Education
19. Musescore
20. Notepad++
21. Paint.net
22. Silverlight (likely already installed)
23. Symantec Anti-Virus Client (reboot after when prompted)
24. Treesize
25. VLC
26. Windows Essentials installer- Movie maker and Gallery Version 16.4

Once all the applications in the above list are installed, and there are no more windows updates to do, you should **take a snapshot in vSphere. This is VERY important.** This is so that if you have any issues moving forward, you have all updates done, and all applications installed, which is a good place to start from as doing all of this can be time consuming, and issues that cause you to start from the beginning can occur.

1. Windows Activation

The deployed images get activated via the KMS server, so there is no worry for a windows key.

2. Capture image

1. Now open command prompt as admin and enter the following commands:

- `cd C:\windows\System32\Sysprep\` - change directory to this location
- `gci` – this will show you the contents in your current location, so you can see if your unattended file that you will be using is there is not.

Once in that directory and the unattended file is in there, run the following command:

- `C:\windows\system32\Sysprep> .\sysprep.exe /generalize /oobe /shutdown /unattended:unattend.xml`

2. Open the VM settings and set the machine to boot to bios or network.

a. To Network boot do the following:

- i. Right click on the VM in the list in VSphere
- ii. Click “Edit Settings”
- iii. “VM Options”
- iv. “Boot Options” sub menu
- v. Tick force EFI setup to choose where to boot from

3. Go to QMCWDS001 and open the WDS tool. Enable the current capture, “1903 Capture” option.

4. Go into VSphere and run the client. If you choose to BIOS boot, Mash F12 AND click the image at the same time so that you can get into the BIOS to boot from the network.

5. Once you have gotten to where you can select a network boot item to load, boot into the *Capture* image. From here you will have to name the image, and choose which image group to add it to but after that it will begin to capture.

4. Drivers for machines

The best way to get the latest drivers in a format that can be imported into WDS is to search for “*vendor_name* SCCM”. The SCCM is the System Center Configuration Manager, which if you are lucky enough will be one downloadable package that contains all drivers for the device you are deploying to. Should you not be able to find the SCCM and can only find individual drivers, then you will have to download them. When sourcing drivers, it will pay to keep them organised.

1. Key structure for driver management

For both of the following methods:

Regardless of how you find the drivers (SCCM package or individual drivers) for the device you are deploying, make sure they are the most up to date version of the drivers for your device.

A good structure to follow for driver organisation is:

- Create a folder for the vendor. E.g HP, Lenovo etc.
- Create subfolders within the vendor folder for each model of device that you will do. You don't need the brand name on these folders, just the model name, e.g within the Lenovo folder you would label the folders as “Yoga L380”, **not** “Lenovo Yoga L380”.

Driver folder on Local Drive > Vendor > Model Name

- e.g *D: drive > _Drivers > Lenovo > Yoga L380*
 - *These will be copied over to WDS exactly as they appear on the system to maintain consistency, so it makes sense to organise them now.*

2. Methods for installing drivers

Method 1:

SCCM Driver Export and Install:

Download the SCCM package and move it to the correct vendor – sub-model folder that you created.

Run the installer, with the install path being the model folder you are running the installer from. This will mean that you get the extracted drivers in the correct spot, and you keep the installer with them too.

You will now have access to the drivers for your device. If you browse the SCCM extracted folder, you will see that it has extracted the drivers and the drivers are categorised based on their type.

Method 2:

You may not be so lucky as to find an SCCM for your device. You may have to download drivers individually, which is fine. On the vendors site, find the drivers for the device you are installing, and download them.

Move these downloaded files into the correct *vendor > sub-model* folders, but you should now create driver-type files, so for instance you know where all of the Bluetooth or LAN drivers are sitting, and it isn't a mess of driver install packages.

When the driver is sitting in its *vendor > sub-model > driver type* folder, you should open it in 7-Zip. Double click on the first folder in 7-Zip, and get to where you can see the "src" file, and some .exe files, and maybe a .txt or .rtf file. Highlight all of these files and copy / extract them out to the root where the driver package that you opened is (still within the driver type sub folder).

Do this for all drivers that are not SCCM packaged. Keep both the extracted files and the installer in the file, as with method 1.

3. Importing drivers into WDS

Once the drivers are exported, copy them to [\\qmcwds001\D:_Drivers](#) while keeping in mind the correct file structure if you are only copying a vendor or model in, and not replacing the whole "_Drivers" file.

To copy to the WDS server, right click the driver file on your computer, then click copy, and then paste them on to WDS server where they should reside)

- Open WDS, and under Servers > QNCWDS001.QMC.local > Drivers create a new folder for your new machine.
- Right click on Driver and click "Add a Driver Group". This will add a new location to the *Drivers* folder that you can then add model-specific drivers to.
- Title this new Driver Group "Vendor Model Name". E.g "Lenovo Yoga L380"
- Do not worry about filters at this stage. Click Next twice.
- Keep the setting "Install only the driver packages that match a client's hardware" toggled. Click Next, and then Finish.

4. Adding drivers to a group

Again, right click on the *Drivers* but this time click "Add Driver Package".

Select "Select all driver packages from a folder", and then browse to the folder that you store the drivers in on the WDS server. Select the Specific device model drivers that you are looking for. Stay at the root of this directory, as WDS will find all the drivers in the model folder that it will import. Click Next when done.

It will then attempt to find all drivers in the defined path, and once it lets you click Next, you should proceed. Don't worry about deselecting drivers, import them all unless you need specific drivers.

Click next to add the packages to the server. It will then start to add the driver packages to the server.

You may get a warning about some drivers not wanting to import, but don't worry about this, unless it is all the drivers. Generally, a failed package is because this package may have come with a previously installed package, so it is already added as a previous package may have been dependent on it. Click Next.

Here you define the Driver Group that these drivers should be added to. This is the Driver Group for the model of device that you created before. From here, you can create the group, so you can either create the group beforehand or create it now. Once you have defined the group or created a group, click Next.

You don't need to worry about filters right now, so click Finish to add the drivers to the group.

5. Adding new machines to Active Directory

Now that the drivers are ready, make sure the correct device drivers are enabled and that there are no other device drivers enabled. From here you can PXE boot the machine. In Windows Deployment Services if there is only one boot image available, it will boot into that. Otherwise, it will let you select an image to boot. You want to boot into (at present) 1903.

If the computer is new to the organisation, then you will need to allow the device to PXE boot. This means going into WDS and under the “Pending Devices” drop down, found under QMCWDS001.QMC.local, and matching the number on the device to the number on the list of pending devices in WDS. If it has previously been part of the organisation and is being reimaged, then it may not need authenticating. Should the device not allow you to name and approve, then you will have to find that device in AD and remove it. This will allow you to name and approve the device.

Note: Do not just “approve” the device. This will by default assign the device as domain admin, which is something that we don’t want to happen.

After authenticating (or not) the files will be sent from WDS to the device. You will then get a splash screen saying the available windows version to install. Click Next. **Be warned:** Once the server initiates the session, the device will start to install the windows image.

Memberships and OUs

On QMCWDS001 open *Active Directory Users and Computers*.

Navigate through the root structure to “Computers” to check for your newly imaged computer. If it is a new (to the domain) computer, it may end up in here. Right click on the newly added computer and click properties. Go to the “Member Of” tab under the properties and check to see if the correct groups are applied. They are as follows:

- For any devices needing wireless, add *Wireless Computers*.
- Add the relevant Meraki group to add the device to one of the following groups:
 - Meraki Teaching Staff – This is for teachers
 - Meraki Admin Staff – This is for anyone not teaching
 - Meraki Student Workstations – This is for shared student machines (Year 4, Year 5, Library, C3 lab, etc)

Once you have done all of this, move the device to the correct OU in by clicking on the newly named computer, and drag it to the group in the tree structure on the left that it should be part of. You could also right click on the device and click “move”. Where the computer will end up depends on what the purpose of the device is, whether it is a staff device, student device, student loan device etc.

6. Things to check before re-imaging

When re-imaging a laptop, it means deleting all files and preferences then applying the custom build of Windows. Before re-imaging a staff laptop, there are things to check to avoid data loss.

- OneNote – Ensure all data is synchronising properly. The main culprit for a problem is out-of-date credentials.
- Make sure accounts are signed in (OneDrive mainly)
- H Drive – Manually sync this and resolve any conflicts. Ideally, and most of the time the H drive keeps files backed up- meaning a re-image wouldn't delete any work. However people are not always aware of a problem with their H Drive, or might dismiss it etc. The H drive stores the following libraries via a folder re-direction policy: Desktop, Documents, Music, Videos, Pictures, Favourites.
- Outlook – This also does not affect most people, as everything in outlook is stored on the exchange server or in the cloud. However some select staff use archived .PST files to view old emails. Check to see if this is the case as they will want it added to their Outlook after the re-image, and it might not be backed up!
- D Drive – This partition is not backed up. Check the D Drive, and back up the work before doing a re-image. Alternatively, you can simply re-image the C: partition only. However I recommend taking a backup of the D drive anyway. If any problems were to appear during imaging, you won't know until it's too late. Ideally the imaging would let you set this manually so you can be 100% sure of what's being deleted.
- Installed software – Check to see if anything needs to be added/reinstalled after the re-image. In most cases you won't need to. Some staff have software that they install themselves, and some software isn't work related, so we don't bother with reinstalling that.
- Very last thing to do before calling the laptop completely imaged is to go to [\\qmc.local\NETLOGON](http://qmc.local/NETLOGON) and run the script "ClearLastLoggedInUser" to clear the last user that was logged in, so it is ready for the recipient of the device to put their username and password in to sign in.

7. How to image a computer from start to finish

First, you will need to have a working Windows image ready to use. Next, you will need the drivers for your device. Should you already have them, then all you must do is make sure all other drivers are disabled and the desired drivers are the only ones enabled. Once this is done, connect the device via ethernet. Next, turn the device on. While it is booting, break the boot sequence and get into the boot menu. This can be done via the function keys, which one it will be is vendor-specific. Once you are in the boot menu, you want to network boot so that you can PXE boot. When you boot from the NIC it automatically requests access to the WDS, so once you have selected the NIC as a boot device it will begin to attempt a PXE boot. If you are having trouble PXE booting, you may need to make sure you are on both Legacy and UEFI, or just Legacy bios. You will need to disable Secure Boot in the BIOS to change the BIOS mode.

Once the device has PXE booted, you may have to approve the device via WDS. This means going into WDS server, then into the WDS software, and under the same tree hierarchy for the drivers will be a folder named "pending". Go into here and **name and approve** the device should it need it. If it won't let you name and approve due to the device already existing, remove the device from AD and try again. Do not decline the device or approve the device. Only ever name and approve. If it didn't need approval, continue on.

Select the boot image to load, which in this case is the 1903 boot image. It will most likely be the only, or one of the only images available to boot from. At this point you will only have to click "next" or "begin" and the image will deploy to the device.

Once the image has successfully deployed, you will want to log in as local admin and change the storage drive settings so that a 240gb drive is split into two 120gb drives, or one 120gb (C:) and the rest on D:, which will be about 117gb.

Switch to either the new users account if possible and begin to install programs, such as Office, Teams, and if applicable the vendors driver update suite. Take a copy of the shortcuts for the Microsoft suite and place them in c:\users\public\public desktop so that any user on the laptop has the desktop shortcuts to the Office Suite, so that they are easily accessible. This is optional, but something that I like to do. Also run Windows updates, and any vendor-specific update packages that might be available through vendor-specific software suite(s).

If you are logged in as the user who is taking over the laptop, then you can log into their Microsoft account on the Office suite, making sure their One Drive is pulling their QMC drive, and their One Note is pulling their QMC notebooks (if required), and that their email is sending and receiving to both internal and external users.

Once this is done, set Chrome to default browser, and you can change the default media apps to be VLC should you want to.

Check for the shared drives and make sure that they have the ones that they require, along with their H: drive.

At this point, the device is set up and ready for the new user to begin using.

8. Device specific configurations

1. Year 4 and 5 Office Suite install

For some laptops you may need to install Office, but it must be an install that can run without needing a user that can log into a Microsoft account with an Office subscription. To do this, navigate to <\\qmc.local\shared\Admininstall> and scroll down to the Office2016 file. In here, run the **batch** file named “setup”. This should open a cmd window, and if it does this and then opens an installer for Office, you know that it has worked correctly. This gets applied to many computers, including the Year 4 COWs, Year 5 COWs, and the loan COWs.

2. Staff laptops

- Check to make sure relevant Adobe is default PDF viewer, and that Edge isn't the default
- Change Chrome Language
- Install Office Suite
- Check Outlook send/receive for external and internal recipients
- Install Creative Cloud (if required)
- Check Word language settings (NZ)
- Change Windows language (NZ)
- Check power settings – aim for power savings
- *Run vendor update suite if applicable and do all of the updates*
- Check shared drives
 - Drives required to be added:
 - Staff – S:
 - (CMD Command) – *net use s: \\qmcstf001\shared_staff\$*
 - Student – J:
 - (CMD Command) – *net use j: \\qmcstf001\shared_student\$*
 - *Personal – H:*
 - *This should get attached by default whenever they log into a machine as it is their personal network attached drive*
- Install vendor-specific system update tool and run all updates

These steps are frequently changing, as it's a constant game of cat and mouse trying to reduce the number and complexity of the tasks necessary after Windows installs. These above steps are for staff, and in some cases can be relevant to students too. When some tasks aren't automatic it practically rules out that feature on a shared computer as the user won't know how to complete the task/setup on

their own at each unique logon. Microsoft Teams gets installed via Group policy, and the Windows build has One Note pre-installed as a Windows App.

3. Student desktops

C3 only - Install Arduino (found on the mag.net student software downloads page)

C3 only – Delete the automatically created Data partition on the SSD, and extend the C partition to use that space

-Import “Restart at Midnight.xml” into task scheduler from [\\qmcwds001\deployments\share\\$\#QMC_MADE\](\\qmcwds001\deployments\share$\#QMC_MADE\)

-Install the full Adobe suite. For an easy installation, use the #LiteTouch script shortcut in [\\qmcwds001\deployments\share\\$\](\\qmcwds001\deployments\share$\)

4. Year 4 Laptops

At present writing both Scratch, and Story Visualiser are applied via group policy on the Year 4 OU. Minecraft needs to be installed manually. The installer script is in C:\Build_files\Minecraft.

5. Year 5 Laptops

Year 5 laptops only get Office manually installed as above, the rest of the software that they might need will be pushed via Group Policy.

Now you should have an image that is ready to be deployed to any device, the knowledge to gather and prep drivers for devices, and maybe even a fully deployed and up-to-date device that is ready for use depending on how you used this document.