

Level 2 - Unit 29 - Set Up an IT System (4 credits)

Gold - Unit 29 - Set Up an IT System

Relevant LINKS

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[Handbook home page](#) [2]

Overview

The candidate can set up a working computer system to meet needs. Candidates will be able to specify the parts needed to build a computer for a specified need. This will include setting up and configuring any required devices such as printers or other peripheral devices. The system will need to be connected to a communication system, either directly or through a network system. The operating system and applications will need to be installed and configured for optimum use. All of this will need to be checked and signed off by a third party.

A work activity will typically be 'non-routine or unfamiliar' because the task or context is likely to require some preparation, clarification or research to separate the components and to identify what factors need to be considered. For example, time available, audience needs, accessibility of source, types of content, message and meaning, before an approach can be planned; and the techniques required will involve a number of steps and at times be non-routine or unfamiliar.

Example of context – set up a computer for a local school or company so that they can use it in their network or as a stand-alone device.

Assessor's guide to interpreting the criteria

General Information

QCF general description for Level 2 qualifications

- Achievement at QCF level 2 (EQF Level 3) reflects the ability to select and use relevant knowledge, ideas, skills and procedures to complete well-defined tasks and address straightforward problems. It includes taking responsibility for completing tasks and procedures and exercising autonomy and judgement subject to overall direction or guidance.
- Use understanding of facts, procedures and ideas to complete well-defined tasks and address straightforward problems. Interpret relevant information and ideas. Be aware of the types of information that are relevant to the area of study or work.
- Complete well-defined, generally routine tasks and address straightforward problems. Select and use relevant skills and procedures. Identify, gather and use relevant information to inform actions. Identify how effective actions have been.

Level 2 - Unit 29 - Set Up an IT System (4 credits)

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- Take responsibility for completing tasks and procedures subject to direction or guidance as needed.

Requirements

- Standards must be confirmed by a trained Gold Level Assessor or higher
- Assessors must at a minimum record assessment judgements as entries in the on-line mark book on the INGOTs.org certification site.
- Routine evidence of work used for judging assessment outcomes in the candidates' records of their day to day work will be available from their e-portfolios and on-line work. Assessors should ensure that relevant web pages are available to their Account Manager on request by supply of the URL.
- When the candidate provides evidence of matching all the criteria to the specification subject to the guidance below, the assessor can request the award using the link on the certification site. The Account Manager will request a random sample of evidence from candidates' work that verifies the assessor's judgement.
- When the Account Manager is satisfied that the evidence is sufficient to safely make an award, the candidate's success will be confirmed and the unit certificate will be printable from the web site.
- This unit should take an average level 2 learner 40 hours of work to complete.

Assessment Method

Assessors can score each of the criteria N, L, S or H. N indicates no evidence. L indicates some capability but some help still required. S indicates that the candidate can match the criterion to its required specification. H indicates performance that goes beyond the expected in at least some aspects. Candidates are required to achieve at least a S on all the criteria to achieve the full award.

Expansion of the assessment criteria

1. Candidates will select and connect up a personal computer safely with associated hardware and storage media to meet needs

1.1 I can describe what IT system components, storage and peripheral devices are needed

Candidates should be able to describe the key parts they are going to use to build their system.

Evidence: will be provided by their plan and assessor feedback.

Additional information and guidance

Before starting to build a system, candidates need to plan out what it is they need and have some idea of the purpose. They could do this in a small report with a table listing the components and how they will be used. It would be useful to have some notes about specific items if they know that

they have a specific way of connecting, or there is a danger of damaging them by not handling them carefully. A good example would be in handling RAM because it is very sensitive to static. There should be some indication here that they are specifying the system based on some pre-determined need. If they are building a computer for someone to play games on, then there needs to be a very high powered processor and graphical capabilities. If they are building a device for an office based worker, they power is not so important as the connectivity, especially to printers.

1.2 I can describe any health and safety issues associated with setting up an IT system

Candidates should be able to describe the main health and safety considerations.

Evidence: will be provided by portfolio work.

Additional information and guidance

Candidates should demonstrate that they understand the health and safety risks of PC use. Some of these will be governed by local and national laws, such as the ergonomics of the computer when it is used to prevent back problems, eye strain or RSI. Other issues will be related to the build of the computer: making sure cables are safe and secure and there are no sharp or dangerous edges exposed to people using the machine. It might be useful for candidates to make a presentation of the health and safety issues for the people who will be using the machines once built. This will demonstrate their understanding of the issues. They should investigate health issues related to computers and be aware of safety problems, for example, you should not be sitting within 1.5m of a laser printer in operation as it gives off dangerous levels of ozone.

1.3 I can describe the characteristics of IT systems that affect performance

Candidates should be able to describe the performance issues of key components.

Evidence: will be provided by their specification plan.

Additional information and guidance

Candidates need to plan how they are going to plan and build their computer and part of this process will be determining if each part is fit for purpose. If they are modifying an older machine for this purpose, they need to be aware that most 32 bit machines have a limit to how much RAM can be used, so putting in 64MB will be a waste as it they will only be able to use 4GB of it. Other issues will revolve around bottlenecks, so making sure that the system can operate as fast and efficiently as possible in the given environment. They also need to be aware that upgrades of some components are determined by other factors, so if they want to speed up an older machine, there will be design based limits so they probably need a new motherboard, this will then need different memory and other components, so it could be a huge undertaking. They need to show they understand if it is really necessary as well.

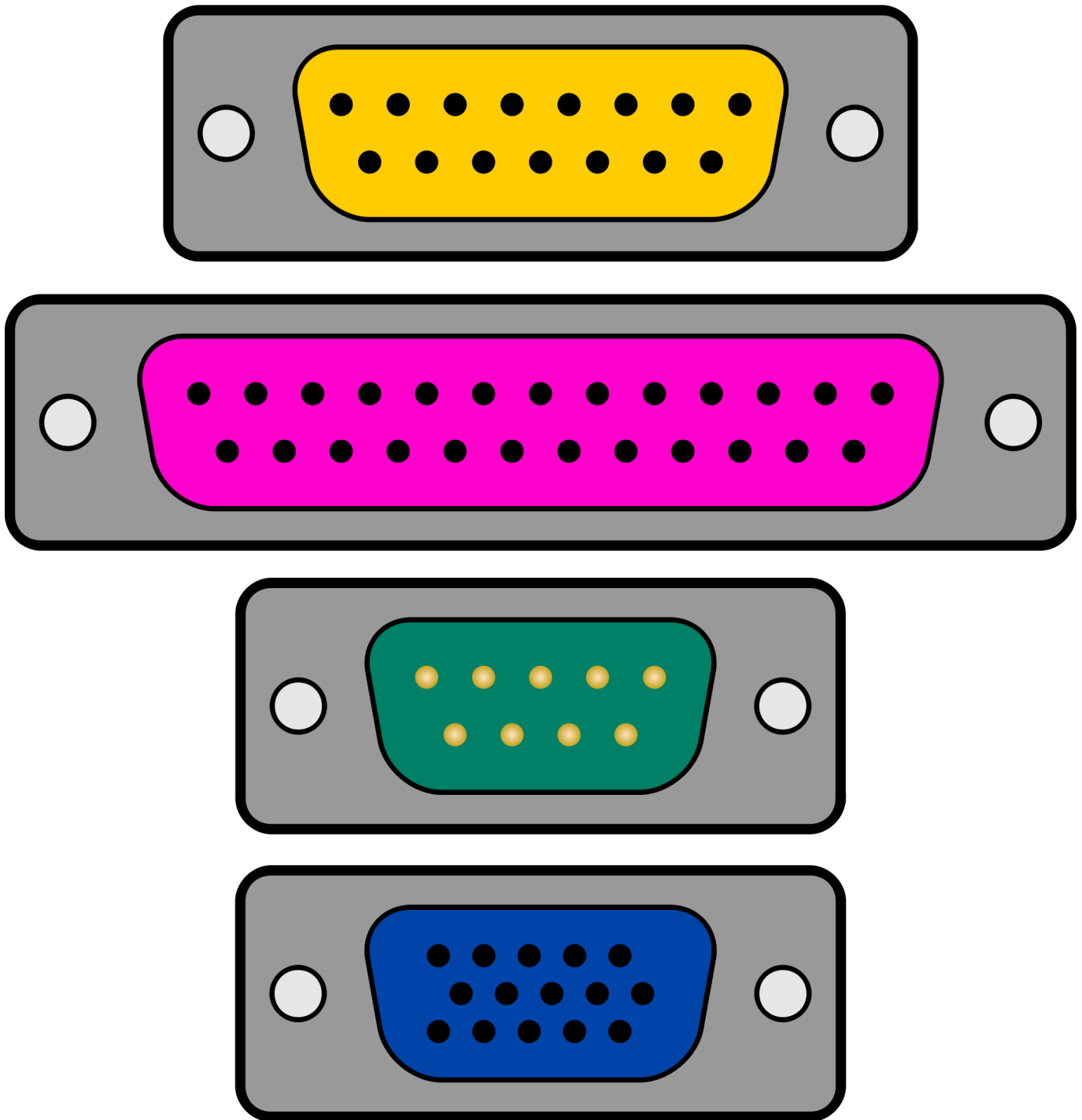
1.4 I can select and connect up the components of an IT system safely, including any peripheral devices and storage media

Candidates should be able to build a system without major problems.

Evidence: will be provided by assessor feedback and client testimonials where appropriate.

Additional information and guidance

Candidates will display their ability to work safely when building their machines. This will involve the use of anti-static tools and care and attention when dealing with sensitive components and peripherals. They should use the correct tools and not strip out small case and motherboard screws etc with oversized tools. When connecting devices, such as monitors with VGA cables, they need to make sure they don't damage the pins in the connector.



This is even more so when replacing something like a CPU where the pins are very small and easily damaged. Most of these devices are **keyed** so they can only be placed in one way, but this is sometimes hard to see. Similarly, the connectors for some hard disk drives can only be used one way, but it is easy to damage them while trying to install them incorrectly.

2. Candidates will select and connect an IT system to a communication service to meet needs

2.1 I can select and connect communication hardware safely to an IT system

Candidates should be able to connect a computer to a network.

Evidence: will be provided by portfolio work and assessor feedback.

Additional information and guidance

A few years ago, this would have required candidates to connect to an external modem device directly and try to configure it all to work. It will likely now be either connecting to a switch which connects to a broadband device or connecting via an Ethernet cable to a network to use a router somewhere in the system. It could also be using Wi-Fi. The device may be built in to the computer, or it could be added as a plug in card. In all instances, candidates need to show competence in their ability to connect the computer to the outside world. Each of these connection types will have different characteristics and procedures, though there will be some similarities, probably around security and roles. In some instances, candidates may need to connect to controlling systems such as network proxies or VPN systems, though this should be unlikely and assessors may need to find systems that are less complex to connect to, though it would be useful for candidates to know these exist and understand some of the reasons behind them.

2.2 I can describe the factors that affect data transfer

Candidates should be able to describe the limitations of different communication systems.

Evidence: will be provided directly from portfolio work.

Additional information and guidance

The factors that affect transmission of data will vary depending on what type of system the candidates are using. In most cases, the signals being relayed are small electrical signals and in most cases these can be affected by other electrical signals and magnetic waves. Other factors will be limitations in other hardware devices. Candidates should know that connecting a computer to a hub will not be as effective as connecting it to a switch as a hub will divide the data signal between all devices equally, but a switch will jump between devices as they need the data transfer speed to maintain that speed as far as possible. There are also other nuances. Some Ethernet cables are designed to carry a maximum signal of 100MB/s. Connecting a Gigabit system (1,000MB/s) to this will mean there is a bottleneck in the system. Many Wi-Fi systems are affected by radio signals and interference from other transmission devices. Even the use of home appliances, such as blenders or coffee grinders, will emit high frequency waves which can interfere with signals. Hard drives have a data transfer limit and these can vary. Solid State Drives can transfer data faster than older mechanical drives and this data transfer limit will slow down machines in a noticeable way. Candidates should show a reasonable awareness of some of the signal limitations of different pieces of equipment and how they react with each other.

2.3 I can select and connect to a communication service from an IT system

Candidates should be able to connect their machine to the Internet.

Evidence: will be provided by portfolio work and assessor feedback.

Additional information and guidance

This may be difficult to evidence in some school and college environments where the restriction on Internet connectivity are very strong. Candidates need to show that they can find the appropriate service, whether that is W-Fi, Ethernet etc and make a connection.

2.4 I can identify the login and password details needed to connect to an Internet Service Provider (ISP)

Candidates should be able to describe the process of making a connection to an ISP.

Evidence: will be provided by portfolio work and assessor feedback.

Additional information and guidance

Level 2 - Unit 29 - Set Up an IT System (4 credits)

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Most people will use a service provider to get their Internet connections. These companies offer a service which consists of a guaranteed connection speed and data limits. Most home based services have various packages that have a set speed of upload and download, as well as data caps or unlimited and all of this is determined by the cost paid. Once an account has been established, the ISP will provide all of the connectivity details to get your system on to the Internet through their servers. Most of this will need to be entered into a provided router and this in turn will be connected to through Wi-Fi or Ethernet.

The screenshot displays a network configuration interface with three connection profiles:

- WAN Connection:** Status: Connected, Type: Ethernet. Includes a "View more..." link.
- Internet_ADSL:** Status: Disconnected, Type: PPPoA. Includes a "Connect" button and an "Information" section with "Last Error Message: None".
- Internet_FIBRE:** Status: Disconnected, Type: PPPoE. Includes a "Disconnect" button and an "Information" section with details on Uptime (8 days, 17:19:53), IP Address, and Data Transferred (2,87 / 41,78 GB/GB).

3. Candidates will install and configure software for use

3.1 I can configure the user interface to meet needs

Level 2 - Unit 29 - Set Up an IT System (4 credits)

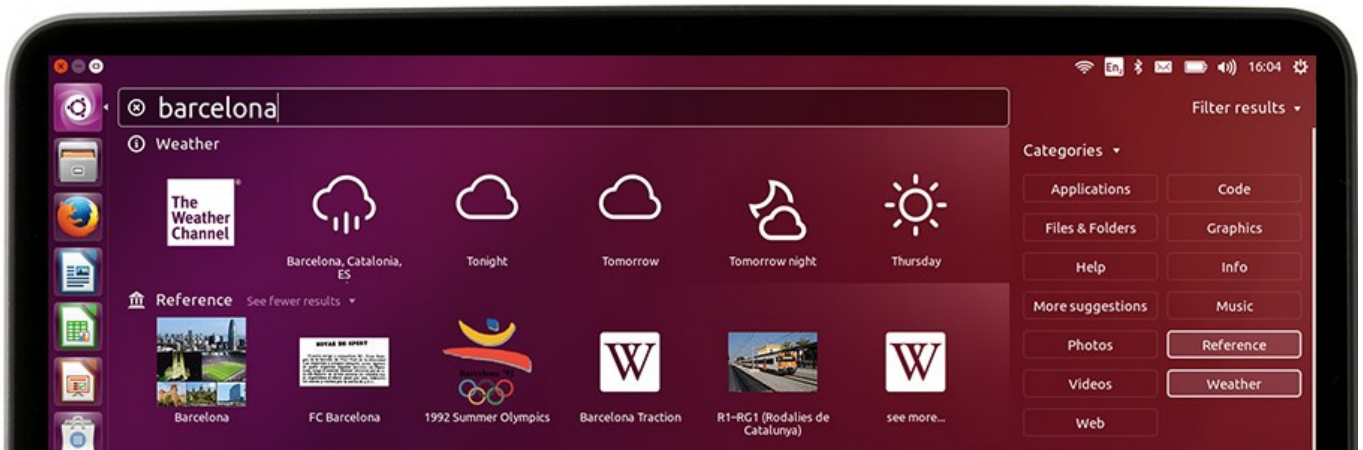
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Candidates should be able to set up a computer for user needs.

Evidence: will be provided by portfolio evidence and assessor/client feedback.

Additional information and guidance

Candidates will set up various desktops for different people, depending on who the machine is for and what its use will be. It may also vary on the type of system. If they are setting up a free operating system such as Linux, there are several different desktops they can use, depending on what the user needs and what performance the system is capable of. Older computers can have a new lease of life by using the [Xfce desktop](#) [3] from Linux as it is lightweight but has all the features required. If the machine is more powerful, they can install something like a [KDE desktop](#) [4] with full transparency and fluid window transitions. Some versions of Linux have their own HUD (Heads Up Display) desktops.



If their user is an elderly person with poor eyesight, they may need to adjust the fonts and other features to be easier to see. They may customise the menu so that the key features are quick and easy to find. They will need to customise the resolution, the various peripheral devices like scanners or printers etc and make sure that the connections to services like the Internet work as expected. In most cases, especially if setting up for inexperienced users, it is best to remove elements that will just confuse users. It would be worth candidates working with an actual client to make sure they can meet the client's exacting needs. If the machine they are building has limited resources, they might try and customise the desktop. On Windows they could test turning off all of the customised transparency elements and other features which use up a lot of power and memory. They might remove bloated software and replace it with lighter alternatives. When using a browser, each open tab will consume a large amount of memory. If the browser already uses a lot of memory, like Chrome or IE, this will make the computer noticeably slower. If the person only wants the computer to surf the Internet, this could be a problem, so perhaps a lighter and faster browser could be an option.

3.2 I can describe what security precautions need to be addressed

Candidates should be able to describe the security issues that will be experienced.

Evidence: will be provided by portfolio work and assessor feedback.

Additional information and guidance

Most issues of security come down to the end user and they may or may not want to be hassled by the security needs required to use a system, however, it should still be pointed out what some of the dangers are. Candidates could possibly put together a presentation or a poster to show the main threats and dangers around. As soon as anyone opens themselves up to the Internet via a connection, they will be under attack from people and BOTs trying to use their computer to attack others or send spam. Most machines are quite vulnerable when they are being set-up as they don't

Level 2 - Unit 29 - Set Up an IT System (4 credits)

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yet have any protection against some of the more serious threats such as worm and trojans etc and could well pick these up as they are being set-up. Candidates need to have a process to check a computer's integrity and make sure it is free from viruses and other malicious software before it is handed over to a user. Linux based systems can install software such as Fail2Ban which will block attacks for a small period of time until they give up and go away. Running software such as this on a home based broadband system can show how many attacks there are which is quite disturbing.

```

                                                                    /var/
Last 20 lines of /var/log/fail2ban.log Only show lines with text
2015-08-12 13:38:14,060 fail2ban.actions: INFO [ssh] 104.217.216.133 already banned
2015-08-12 13:38:33,081 fail2ban.actions: INFO [ssh] 104.217.216.133 already banned
2015-08-12 13:38:51,101 fail2ban.actions: INFO [ssh] 104.217.216.133 already banned
2015-08-12 13:39:06,117 fail2ban.actions: INFO [ssh] 104.217.216.133 already banned
2015-08-12 13:39:17,130 fail2ban.actions: INFO [ssh] 104.217.216.133 already banned
2015-08-12 13:39:29,143 fail2ban.actions: INFO [ssh] 104.217.216.133 already banned
2015-08-12 13:39:40,155 fail2ban.actions: INFO [ssh] 104.217.216.133 already banned
2015-08-12 13:39:52,169 fail2ban.actions: INFO [ssh] 104.217.216.133 already banned
2015-08-12 13:40:02,180 fail2ban.actions: INFO [ssh] 104.217.216.133 already banned
2015-08-12 13:40:15,195 fail2ban.actions: INFO [ssh] 104.217.216.133 already banned
2015-08-12 13:40:26,207 fail2ban.actions: INFO [ssh] 104.217.216.133 already banned
2015-08-12 13:40:40,223 fail2ban.actions: INFO [ssh] 104.217.216.133 already banned
2015-08-12 13:40:54,238 fail2ban.actions: INFO [ssh] 104.217.216.133 already banned
2015-08-12 13:41:07,253 fail2ban.actions: INFO [ssh] 104.217.216.133 already banned
2015-08-12 13:41:16,263 fail2ban.actions: INFO [ssh] 104.217.216.133 already banned
2015-08-12 13:41:33,282 fail2ban.actions: INFO [ssh] 104.217.216.133 already banned
2015-08-12 13:41:47,297 fail2ban.actions: INFO [ssh] 104.217.216.133 already banned
2015-08-12 14:00:17,494 fail2ban.actions: WARNING [ssh] Unban 104.217.216.133
2015-08-13 01:41:55,084 fail2ban.actions: WARNING [ssh] Ban 61.186.245.211
2015-08-13 02:41:55,214 fail2ban.actions: WARNING [ssh] Unban 61.186.245.211
Last 20 lines of /var/log/fail2ban.log Only show lines with text
```

The above graphic shows that there are more than 2 attacks every second. These are all ssh (Secure Shell) attacks which means the perpetrator is trying to take complete control of the machine. There is also software such as Root Kit Hunter which checks the system for trojans and other invasive software attacks.

[Press <ENTER> to continue]

Checking for rootkits...

```

Performing check of known rootkit files and directories
55808 Trojan - Variant A [ Not found ]
ADM Worm [ Not found ]
Ajakit Rootkit [ Not found ]
Adore Rootkit [ Not found ]
aPa Kit [ Not found ]
Apache Worm [ Not found ]
Ambient (ark) Rootkit [ Not found ]
Balaur Rootkit [ Not found ]
BeastKit Rootkit [ Not found ]
beX2 Rootkit [ Not found ]
BOBKit Rootkit [ Not found ]
cb Rootkit [ Not found ]
```

3.3 I can set up and configure virus protection software

Level 2 - Unit 29 - Set Up an IT System (4 credits)

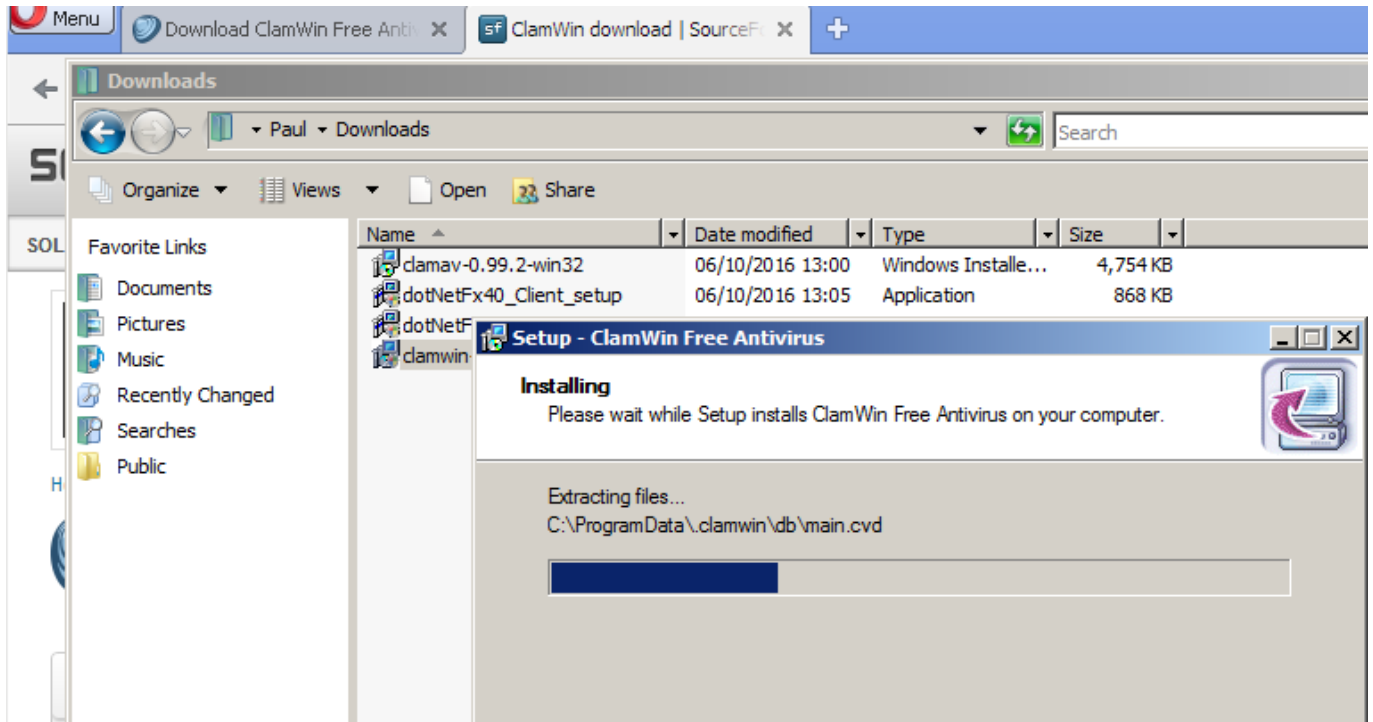
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Candidates should be able to set up some software to protect the system against viruses.

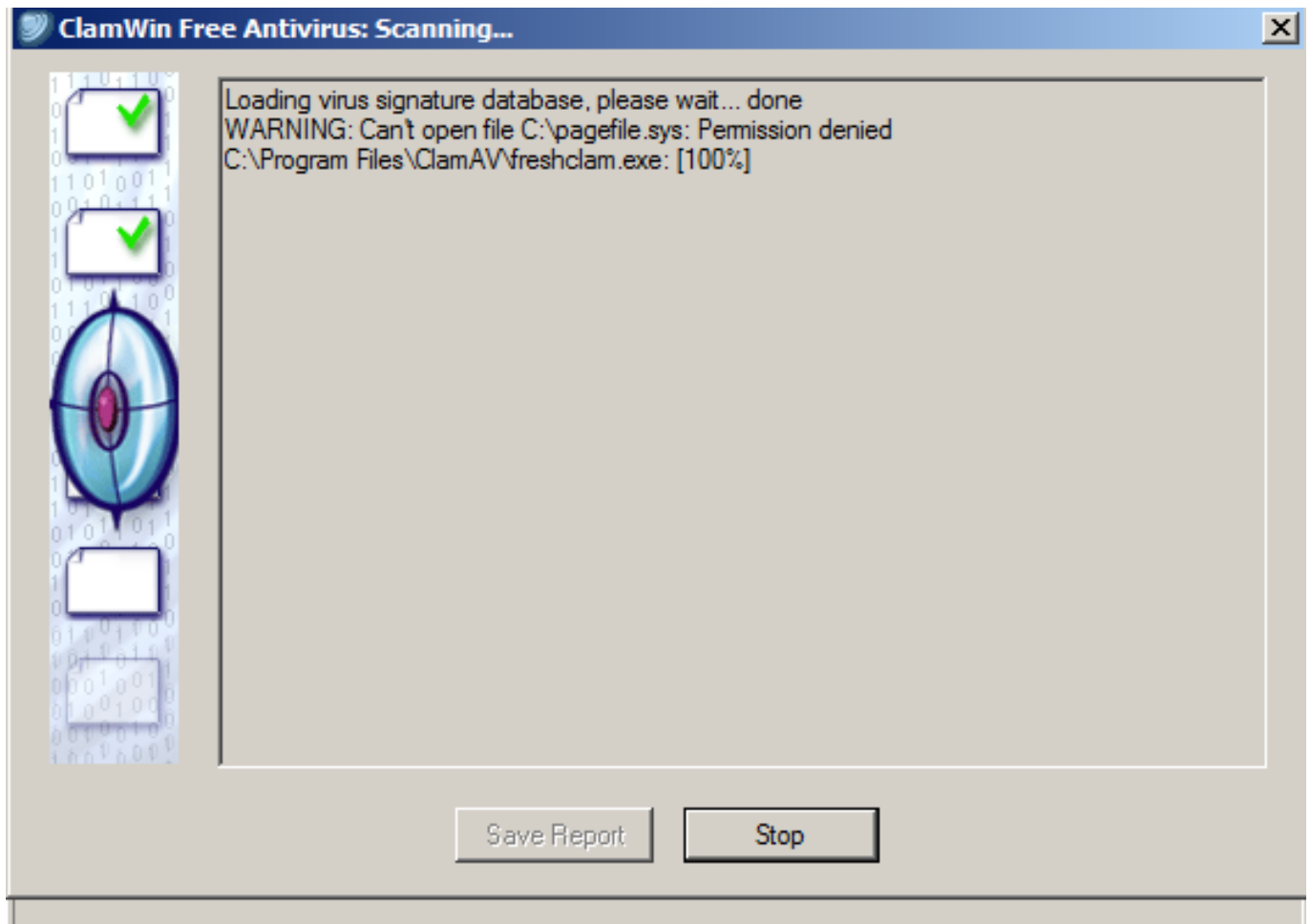
Evidence: will be provided by portfolio work and assessor feedback.

Additional information and guidance

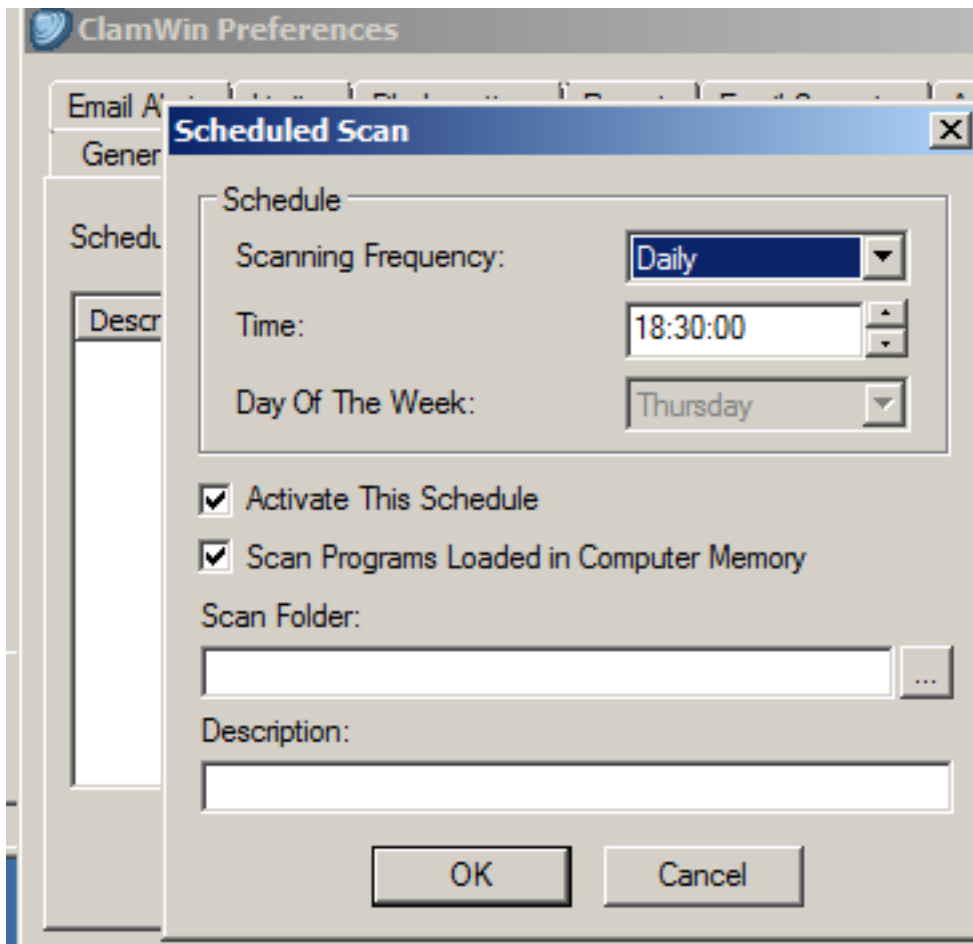
Most systems have some form of defence against basic threats and malicious software, but there are more sophisticated software packages that are available, either free or paid for. Candidates should be able to demonstrate that they can find and install a piece of software for this purpose and at least check that it is set up correctly. The following shows a system installing a free software package.



Once it is installed, it is possible to check for various viruses and other malware.



Many packages will have scheduling facilities and the ability to isolate and destroy viruses that are found. This should be demonstrated by candidates to make the user's life a little easier.



3.4 I can install and set up application software to meet needs

Candidates should be able to install and configure additional applications.

Evidence: will be provided by portfolio evidence and client feedback.

Additional information and guidance

Meeting this will depend on what type of system is required and will vary between candidates. Some will only be required to install and configure an office suite, while others may need to install and configure additional software, such as graphics programs or music development suites. To avoid any licensing and copyright issues, it is probably best to stick to open source versions of the required software, unless the customer wants to pay the full license costs.



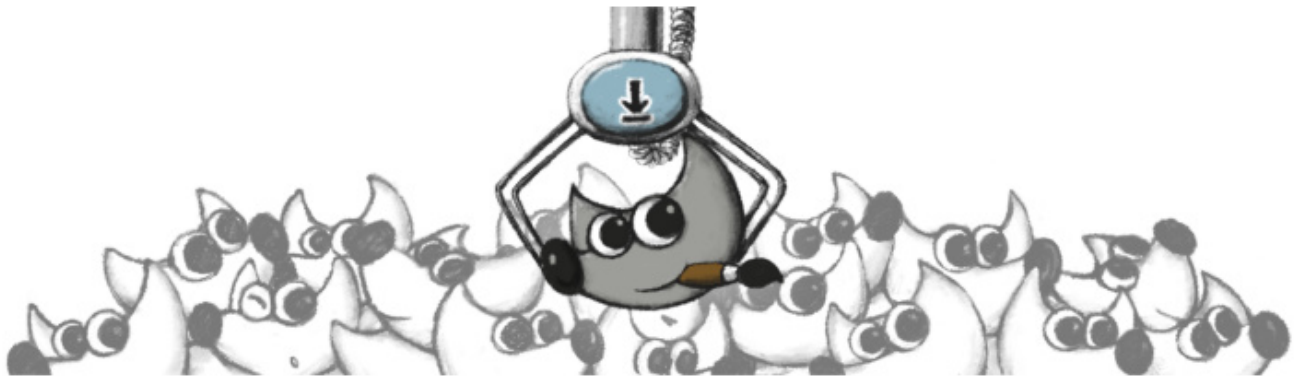
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Current Stable Version

The current stable release of GIMP is **2.8.18** (2016-07-14).

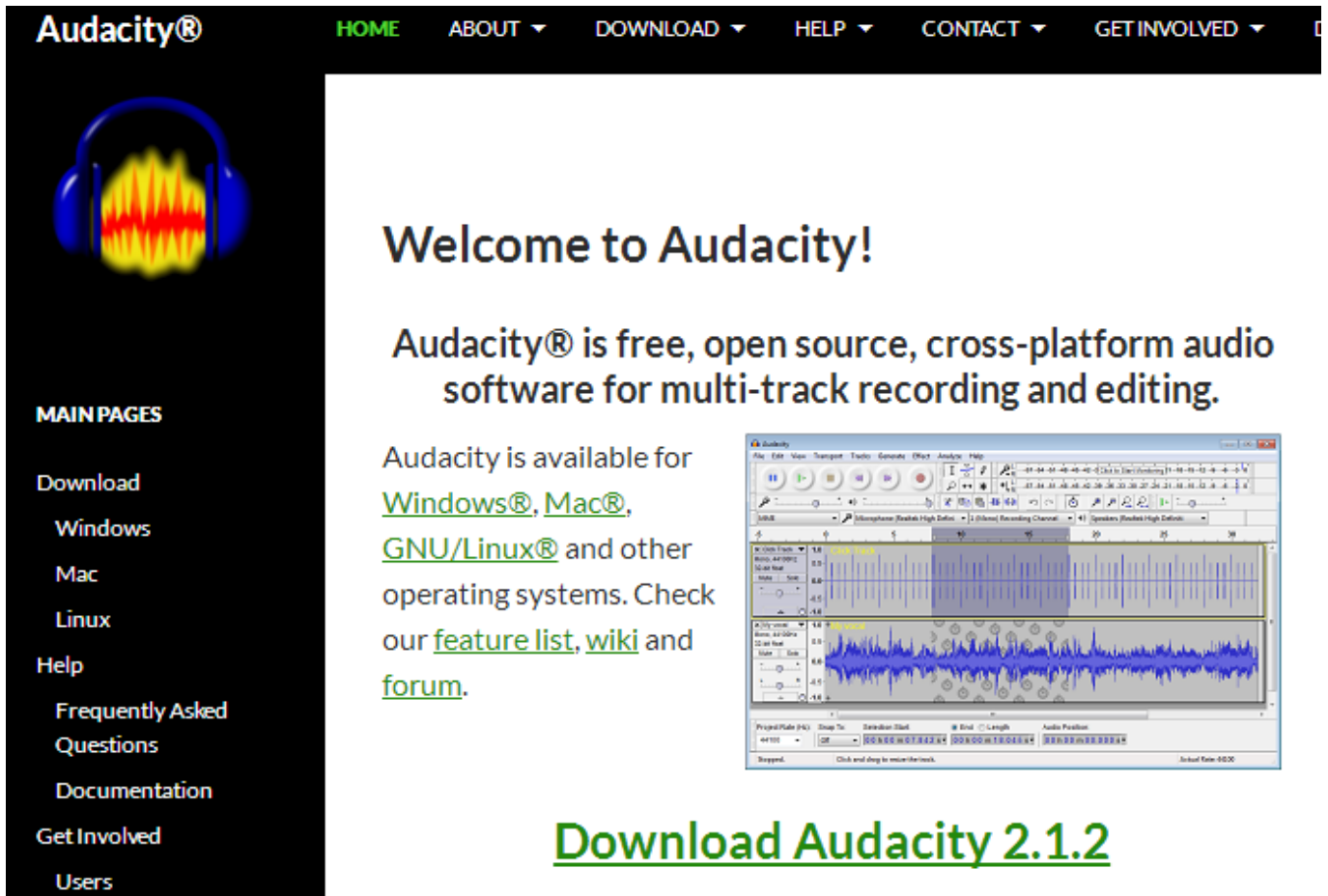
We think your OS is *Microsoft Windows*.

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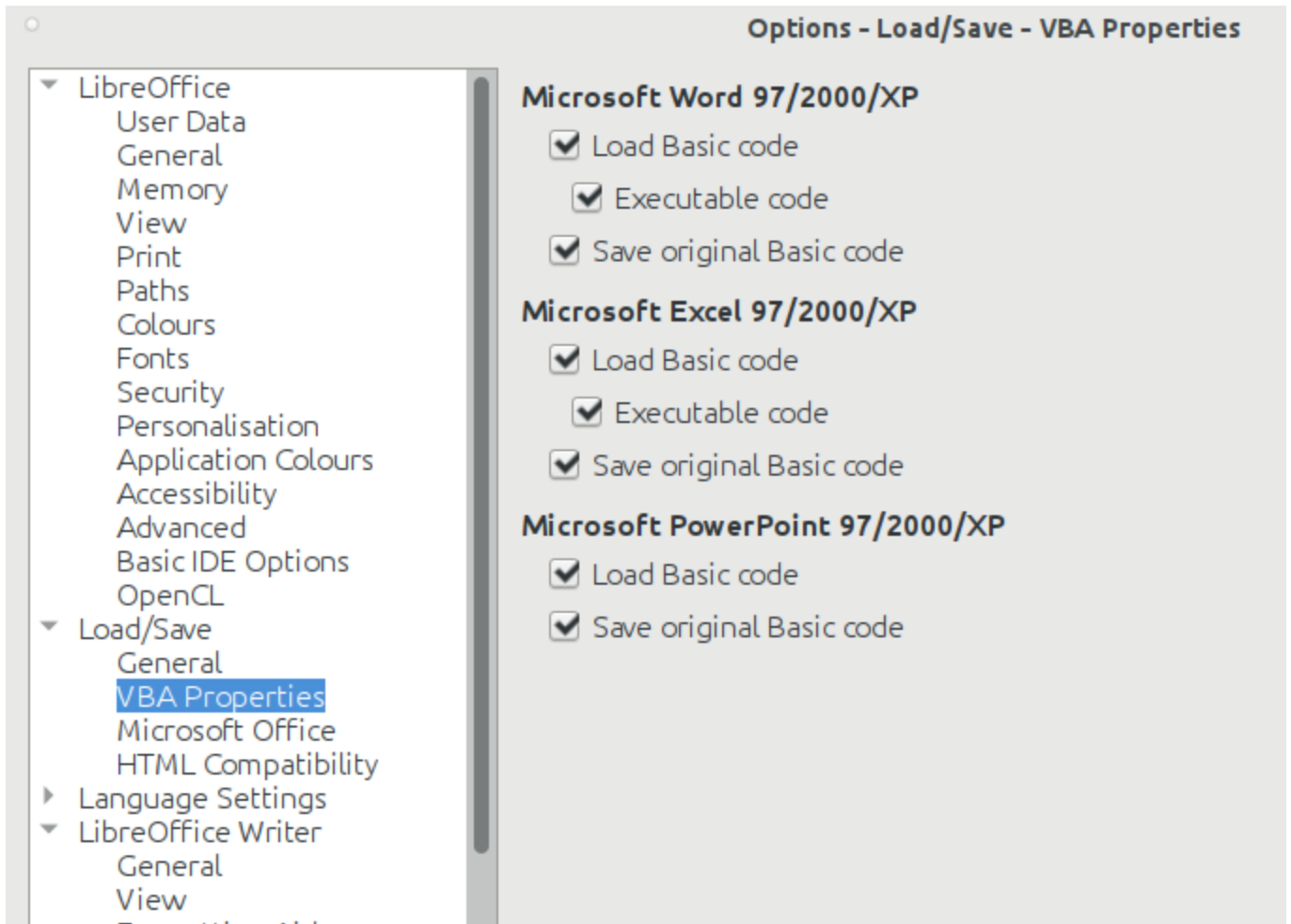
Welcome to Audacity!

Audacity® is free, open source, cross-platform audio software for multi-track recording and editing.

Audacity is available for [Windows®](#), [Mac®](#), [GNU/Linux®](#) and other operating systems. Check our [feature list](#), [wiki](#) and [forum](#).

[Download Audacity 2.1.2](#)

Once downloaded and installed, they can be configured as required.



3.5 I can backup and restore system and data files

Candidates should be able to demonstrate basic house-keeping tasks


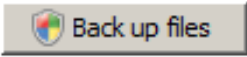

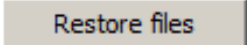

Evidence: will be provided by portfolio work and assessor feedback.

Additional information and guidance

As with the above criterion, most systems have a backup and restore facility, though you can purchase other packages with more features. Nothing is worse than losing data or having a corrupted system so it is good practice to backup and restore the system, at least do a dry run to make sure it all works. It is no good having a backup if it can't be restored either.



Protect your files by backing them up

 Back up files
Create backup copies of your files and folders. 
 Restore files
Restore files and folders from a backup.  Advanced restore
 Use System Restore to fix problems and undo changes to Windows.

The software usually allows external backup and restore devices if available. It is best to backup and keep it somewhere safe and not near the same computer.

4. Candidates will check that the IT system and communication service are working successfully

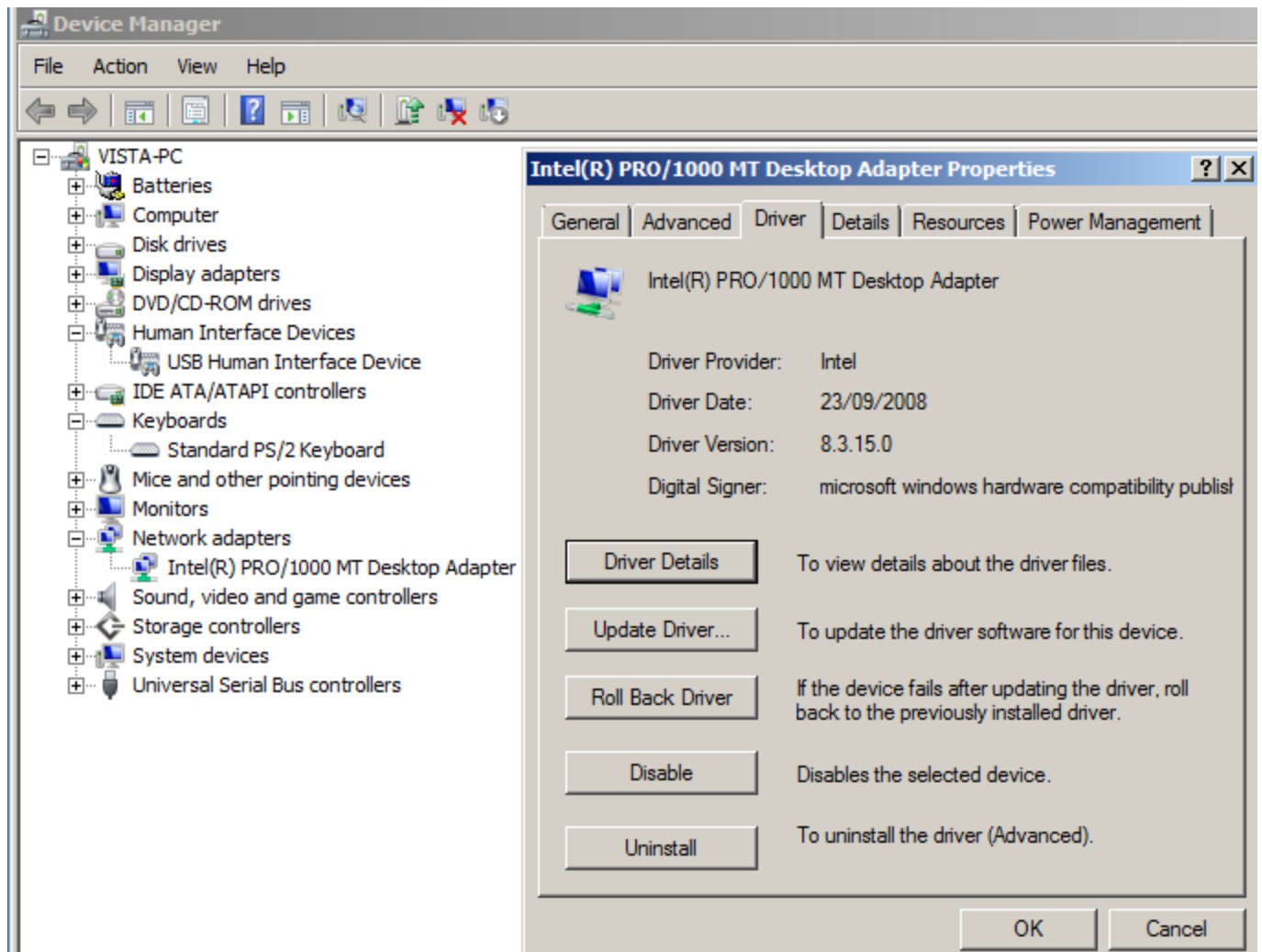
4.1 I can identify what tests can be used to check the IT system and communications

Candidates should be able to carry out some basic tests on their system.

Evidence: will be provided by portfolio work and assessor feedback.

Additional information and guidance

There are various tests and testing utilities built in to an operating system that candidates can and should use. The control panel should show that devices are working properly and will highlight if any issues are detected. They can also check diagnostics for the internet connection or other networking facilities.



Any devices that are not working with show a warning sign and can be investigated further.

4.2 I can select and run suitable tests to make sure that the system and communication service are working successfully

Candidates should be able to describe the purpose of their work and why using IT adds value to it in some way or ways.

Evidence: will be provided directly from the presentation of work in web pages that has clear purpose and describes the purpose of the work.

Additional information and guidance

A simple test to see if the Internet connection is working is via the command line with **ipconfig /all**. This will show if the network has an address and is connecting to a wider network. PING (Packet Internet Grope) can also be used to check end to end connectivity.

-->

```
Command Prompt
C:\Users\Paul>ipconfig /all

Windows IP Configuration

Host Name . . . . . : Vista-PC
Primary Dns Suffix . . . . . :
Node Type . . . . . : Hybrid
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No
DNS Suffix Search List. . . . . : lan

Ethernet adapter Local Area Connection:

Connection-specific DNS Suffix . . : lan
Description . . . . . : Intel(R) PRO/1000 MT Desktop Adapter
Physical Address. . . . . : 08-00-27-46-41-7D
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes
Link-local IPv6 Address . . . . . : fe80::e950:f817:fc93:16f6%8(Preferred)
IPv4 Address. . . . . : 10.0.2.15(Preferred)
Subnet Mask . . . . . : 255.255.255.0
Lease Obtained. . . . . : 10 October 2016 14:41:11
Lease Expires . . . . . : 11 October 2016 14:41:11
Default Gateway . . . . . : 10.0.2.2
DHCP Server . . . . . : 10.0.2.2
DHCPv6 IAD . . . . . : 201850919
DNS Servers . . . . . : 10.0.2.3
NetBIOS over Tcpip. . . . . : Enabled
```

```
Command Prompt
Microsoft Windows [Version 6.0.6000]
Copyright (c) 2006 Microsoft Corporation. All rights reserved.

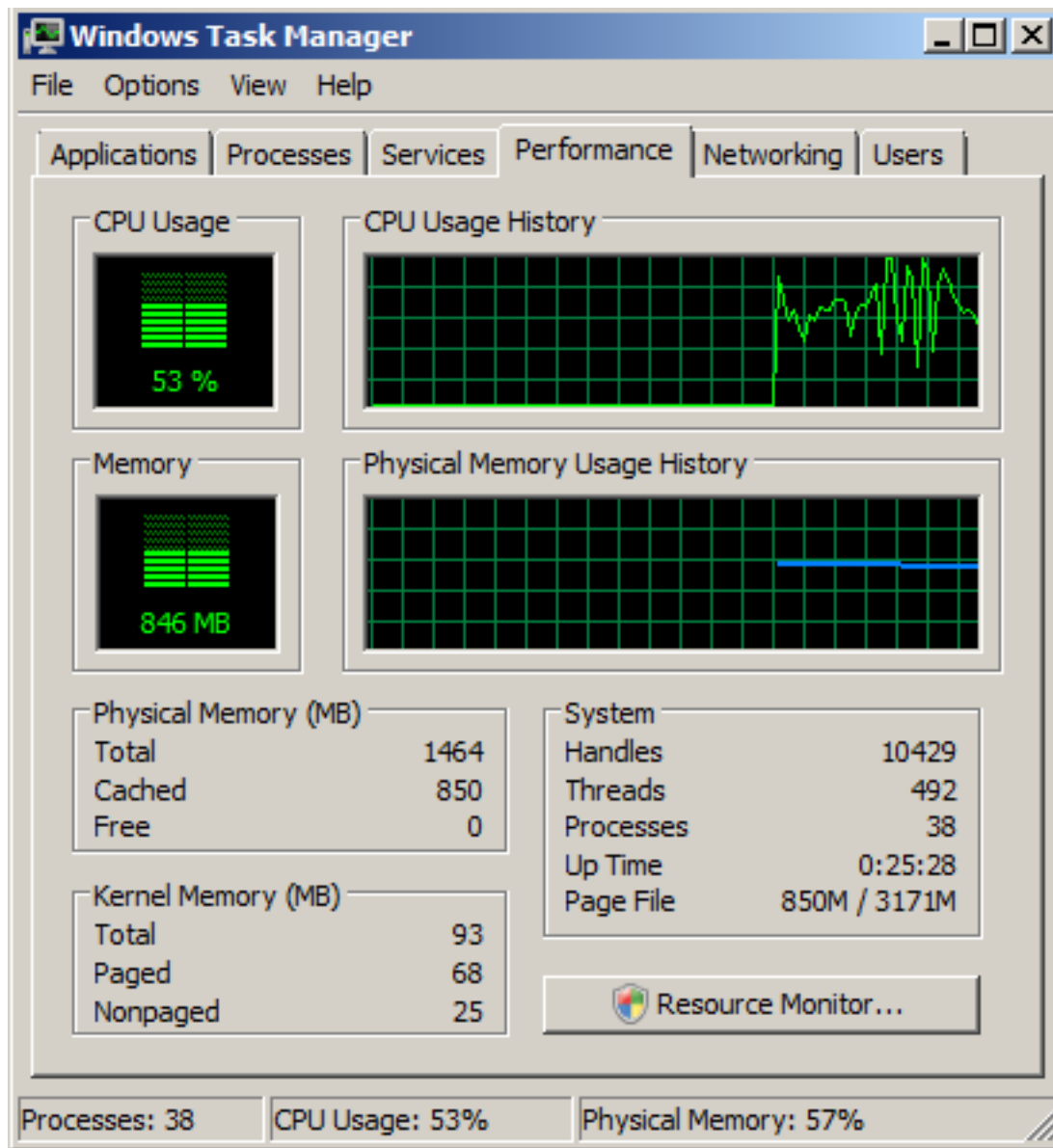
C:\Users\Paul>ping bbc.co.uk

Pinging bbc.co.uk [212.58.244.23] with 32 bytes of data:

Reply from 212.58.244.23: bytes=32 time=11ms TTL=127
Reply from 212.58.244.23: bytes=32 time=10ms TTL=127
Reply from 212.58.244.23: bytes=32 time=10ms TTL=127
Reply from 212.58.244.23: bytes=32 time=10ms TTL=127

Ping statistics for 212.58.244.23:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 10ms, Maximum = 11ms, Average = 10ms
```

Other graphic tools can be used from the control panel to see if there is connectivity and the speed and drivers. The **Task Manager** is a useful tool for overall performance and diagnostics.



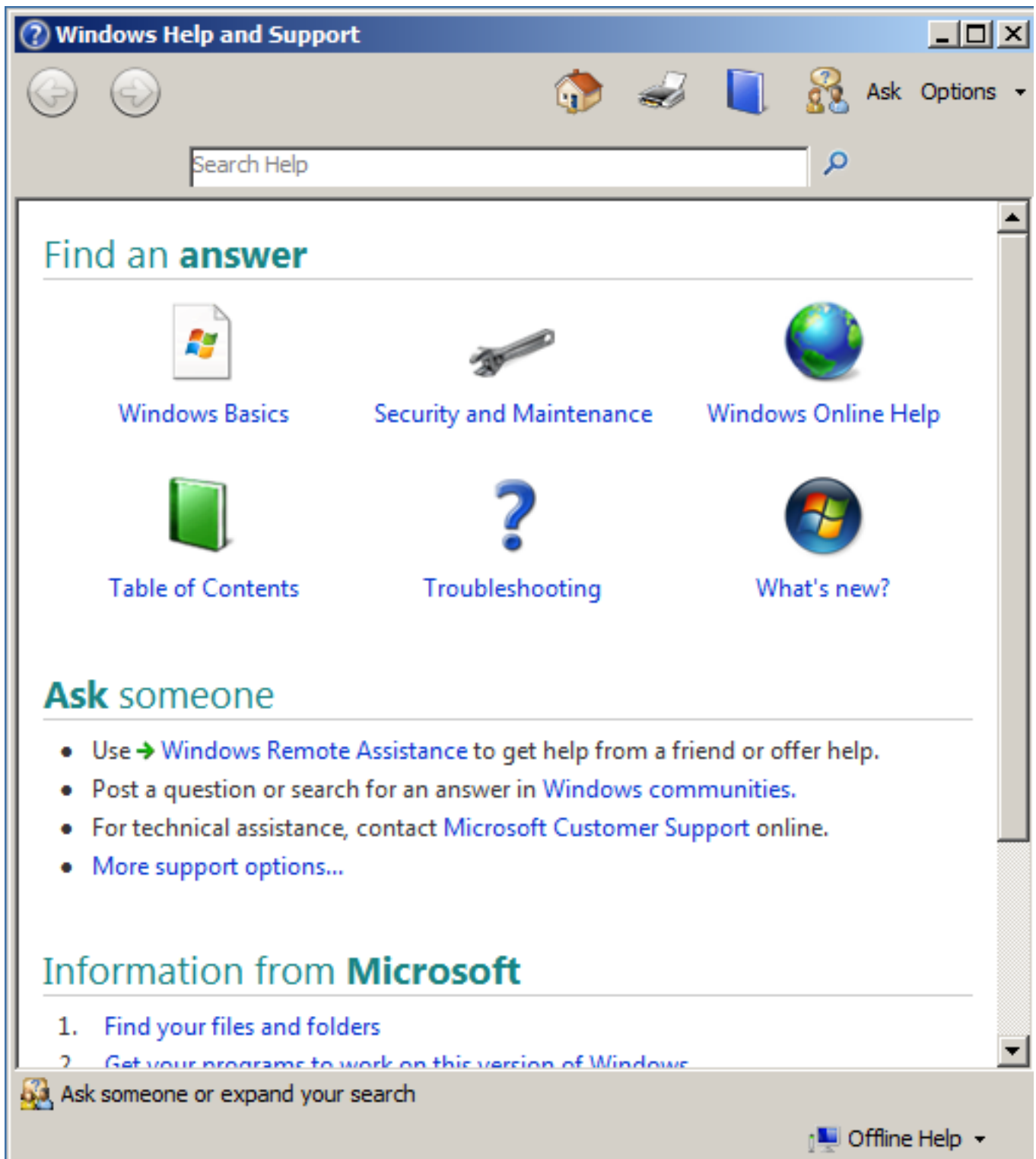
4.3 I can identify the help and troubleshooting facilities available to solve problems

Candidates should be able to find help where appropriate.

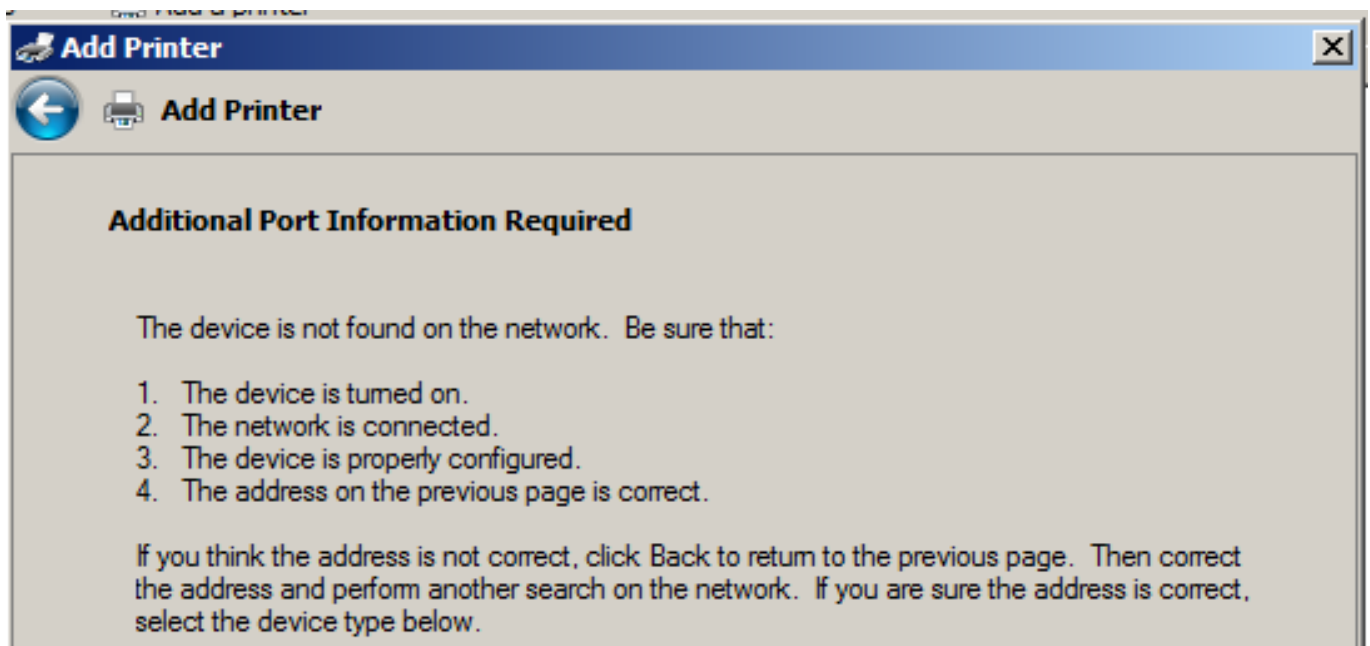
Evidence: will be provided by portfolio work and assessor feedback.

Additional information and guidance

The various diagnostic elements of an OS have already been mentioned and candidates should be comfortable knowing how to use these and the strengths and weaknesses. Systems usually have built in help as well so they should be able to use these facilities. Systems like Linux have help files built in to the command line to make them easier to manage and quicker to access, especially if the trouble you are having is with the graphical system as the GUI help will be of little use then. In Windows based systems, there is usually a symbol to designate help features in applications as well as a help and support system.



These GUI have search facilities to find specific elements. Some applications will have troubleshooting options when all else has failed. Usually there are some suggestions.



Beyond this it will trigger an interactive help menu with more suggestions and tips. Candidates should know how to use these on any operating system.

Installation software also has read me files which sometimes help with installation or configuration problems.

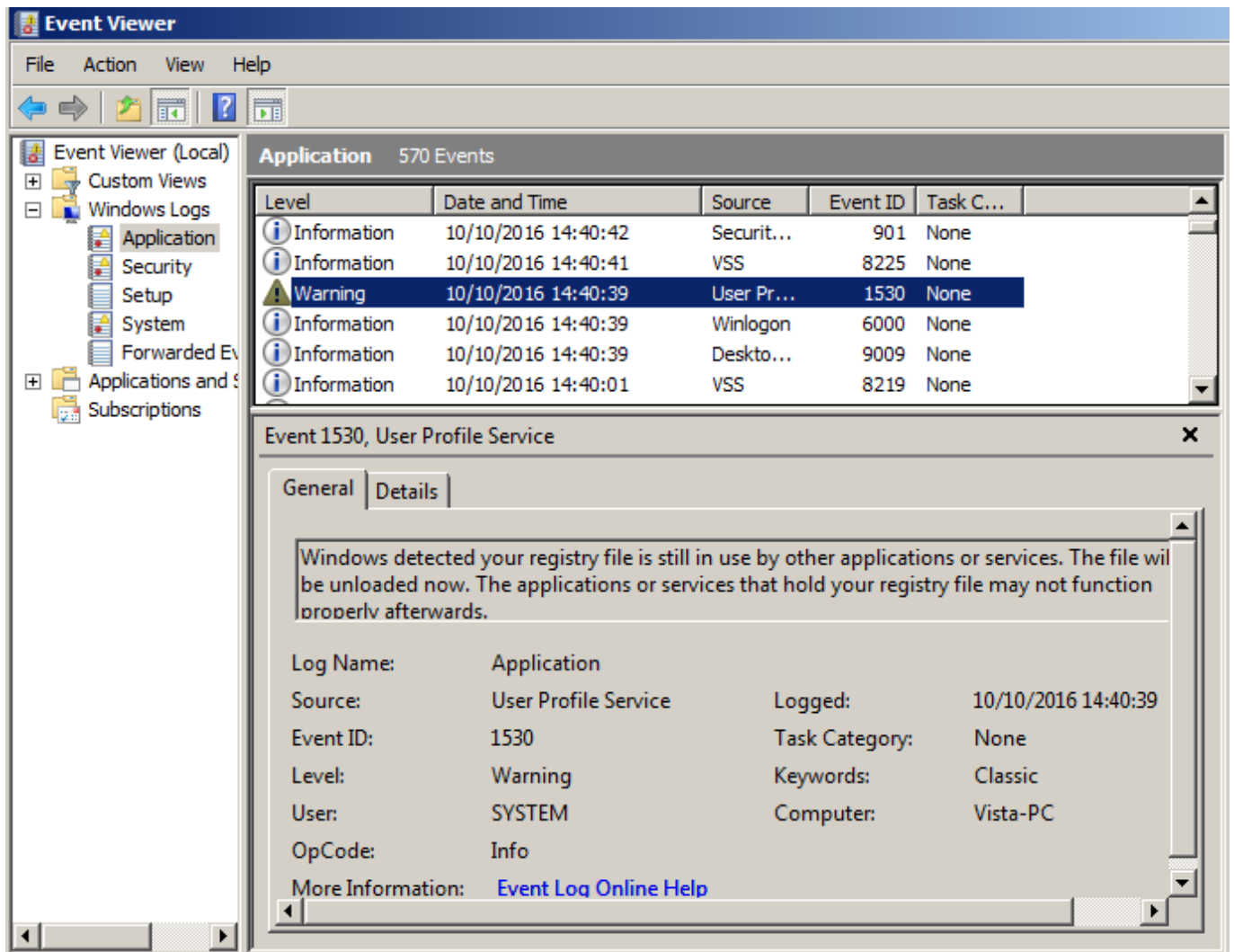
4.4 I can respond to faults and error messages and use help and troubleshooting facilities to determine and take appropriate action

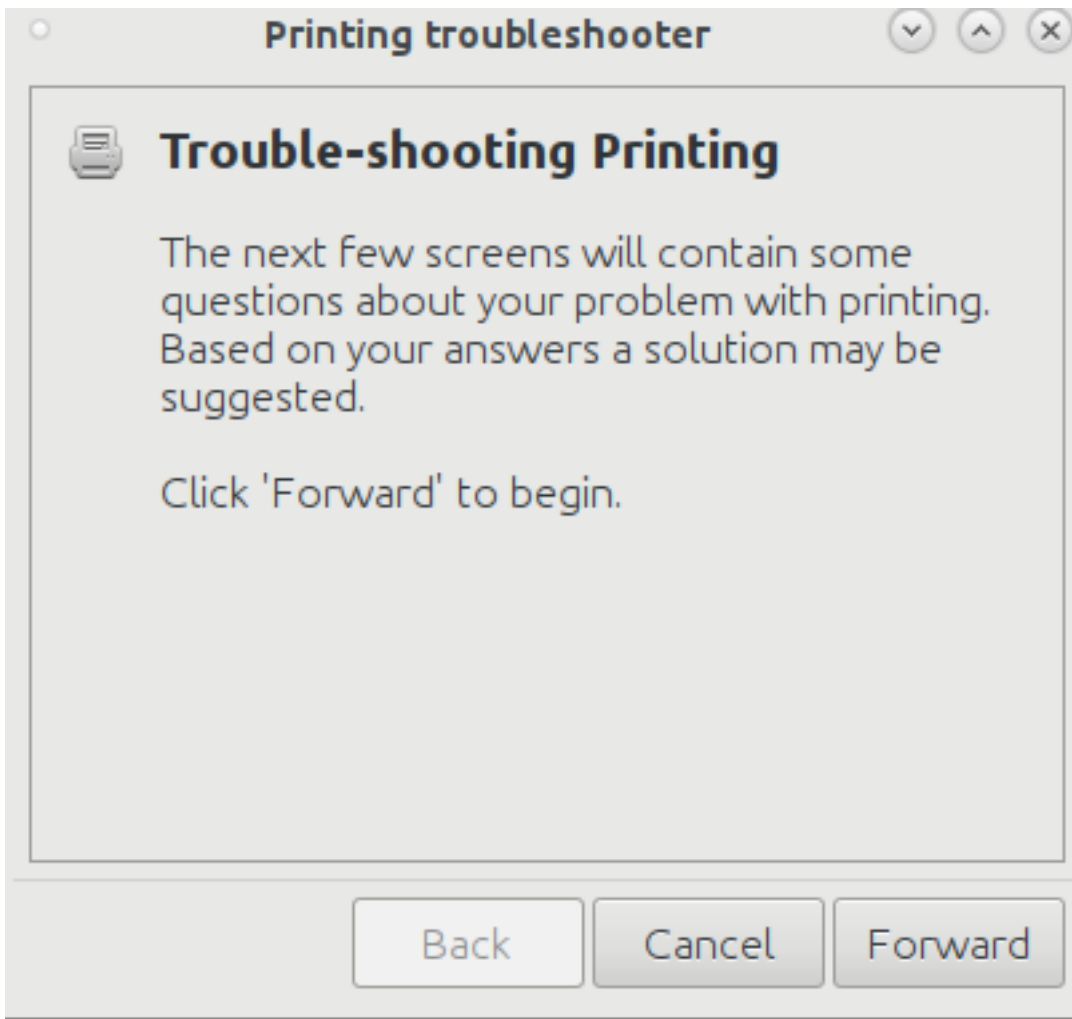
Candidates should be able to fix basic problems with the tools available and some experience.

Evidence: will be provided by portfolio work and assessor feedback.

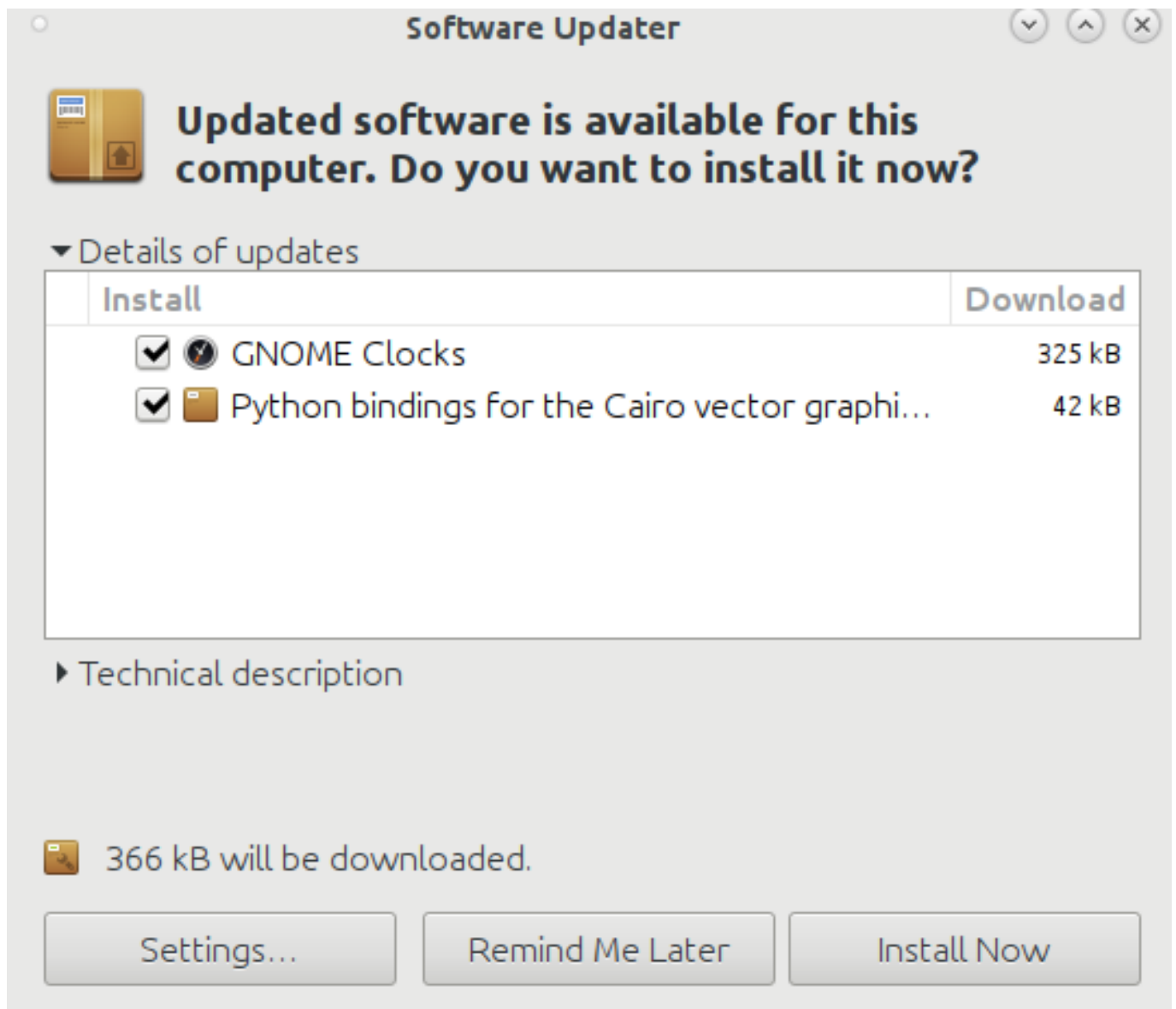
Additional information and guidance

Some issues are not immediately obvious, though could still be causing issues. One useful place to find these, on Windows systems, is the **Event Viewer** which can be found in the administrative section of the control panel. This tool shows the system logs which allow you to identify issues and get some indication of what problems there are.





The information given should help track down where and why it might have had a problem and possibly fix it. In many instances it can be fixed with a software update as this will have updated code and improvements. Sometimes it is worth going onto the website to search for issues as many other people may have found the problem and resolved it already.



Moderation/verification

The assessor should keep a record of assessment judgements made for each candidate and make notes of any significant issues for any candidate. They must be prepared to enter into dialog with their Account Manager and provide their assessment records to the Account Manager through the on-line mark book. They should be prepared to provide evidence as a basis for their judgements through reference to candidate e-portfolios and through signed witness statements associated with the criteria matching marks in the on-line markbook. Before authorizing certification, the Account Manager must be satisfied that the assessors judgements are sound.

Source URL: <https://theingots.org/community/sil2u29x>

Links

- [1] http://theingots.org/community/ITQ_unit_development
- [2] <http://theingots.org/community/handbook2>
- [3] <http://www.xfce.org/>
- [4] <https://www.kde.org/workspaces/plasmadesktop/>

