

# HND Graded Unit

Combined Document

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# **1. Analysis**

## **1.1. Investigation**

Details of the specialist's initial investigation into Crichton Memories include the scenario which includes the details of the current network, potential upgrade plans or solutions and details of the staff and building. The investigation shall also explain how the specialist gained the information required from the client and if or any topics that relate to the scenario. The details gathered from the client will allow a description of the current network and highlight problematic details that could affect the course of the upgrade.

### **1.1.1. Scenario**

Crichton Memories have requested a computer and network specialist employed by NetSolutions to perform an evaluation and upgrade on their company network as requested by the managing director. The company is a small company with a basic network that is no longer efficient in coping with the company's requirements due to poor speed quality. The network is also understood to be unreliable and difficult to expand. Crichton Memories maintain a building in Dumfries that has two levels containing multiple rooms which host various departments to the company.

### **1.1.2. Client Inquiries**

To gain a much further in-depth understanding the client held several interviews with the specialist over a number of weeks to help them gain valuable information about the current network and to question the client on details relating to the upgrade. During these interviews the specialist asked various questions and the minutes were recorded accordingly (Please view Appendix's 1.1.2.1 - 1.1.2.4).

### **1.1.3. Course Units**

Courses that would be considered useful to this scenario would be firstly and importantly Professionalism and Ethics (Appendix 1.1.3.1) as multiple legislation acts will apply through the upgrade process especially the areas where personal data is handled and relating to how, when and why the company computers are used. Beyond the legal requirements the scenario entails the computing skills that may be required is installation and maintenance (Appendix 1.1.3.2) on the existing systems if the specialist decided they could remain although this would also be required if new systems were brought in and had to be assembled. Also similar to the previous point the ability to troubleshoot problems (Appendix 1.1.3.3) with the new or old hardware and software would be required as some features may become non compatible if any upgrades are installed. Another topic that would be relevant to the scenario would be the ability to configure and set up local area networks (Appendix 1.1.3.4) as this is what the main requirement the managing director requires from this upgrade. Next, the ability to configure operating systems (Appendix 1.1.3.5) will be required due to newer operating systems on the market the company must ensure their current or new operating system is correctly configured for all requirements of staff within the company. Depending on the specialist's choice, the company may wish to invest into

cloud computing (Appendix 1.1.3.6) which could help them compete with other larger businesses while reducing money on spending on hardware and maintenance. Security concepts and forensics (Appendix 1.1.3.7 & Appendix 1.1.3.8) would be important as again it is important to refer to legislation hence maintaining a good security system is going to be required to protect company data. The final unit required will be the understanding of data communications (Appendix 1.1.3.9) as through the upgrade the client will expect a faster method of transfer so it's important to understand how transfer speeds are achieved.

#### 1.1.4. Existing Systems

The existing network uses a peer to peer network topology with 13 computers, a server and 10 printers. The cabling is described to be unprotected and is currently left on the floor; the type of cabling used is coaxial with the connectors being BNC (Bayonet Neill-Concelman). The network cards support the BNC connections and give the speed of 10 mbit per second. The current computers use either Pentium 3 or 4 processors with RAM varying from either 1 or 2GB. The operating systems in use are either Windows XP featuring Service Pack 2 or Windows XP Professional and the internal storage in the computers varies from 100GB, 150GB or 200GB. The server also runs Windows XP Professional although it has IIS (Internet Information Services) setup. The printers that are currently in use are either inkjet or laser printers which varies between departments. The accounts department have 2 Epson Stylus Colour 600 printers and 1 Intellefax brother 4 100 which are both inkjets while the purchase, sales and managing director use HP LaserJet 6's. The purchase and sales departments each have 3 of these printers while the managing director has 1. The software on the existing computers features basic word processing, database, spreadsheet and presentation software along with the departments all having access to Pegasus Opera II version 7.20.10. The sales manager has exclusive access to Dreamweaver.

Currently there are no backups in place in any form and the security of the computers is only done by a basic username and password system. The client did mention there are currently log on hours in place for the staff which is from 8am to 6pm. The company has a website Domain called [www.memories.co.uk](http://www.memories.co.uk) but the phone is the only available method of communication.

## 1.2. Problem Analysis

Once all the details were gathered the specialist began to look at the problems relating to the upgrade, referring back to the minutes taken from the interviews.

### 1.2.1. Computer Access and Generic Software

Firstly, it was noted that the topology which is peer to peer is described to be difficult to upgrade hence a new server-based network was proposed to replace the peer to peer network which would provide more of a structure to the network which is required for the company's needs. Upgrading to a server-based network will also increase the security of the network as there will only be one location where files are stored instead of several unnecessary copies on different systems. The specialist proposed a new server network which would be used as a domain along with another server to act as a member server while a final backup server would be in place, each of these servers will utilise Windows Server 2012. Only the managers should be given access to the server room. The currently existing client computers will be replaced with newer systems which will operate much faster and efficiently running a newer version of Windows while containing newer version of existing software such as Microsoft Office and featuring more departmental exclusive software. To provide access to the internet a hub will be installed in the server room with routers around the building which will provide wireless access as an optional feature for other devices. Due to the companies expected 20% growth over the next two years extra computers will be purchased to support future staff. The printers in the building shall be replaced with newer models and a few more will be purchased for the receptionist and the meeting room.

### 1.2.2. Other Software

The new computers installed in all departments will have access to a newer version of their Pegasus software and a feature only available to the sales manager will be a newer updated version of Dreamweaver. A new ledger system will be implemented into the network for the sales and purchase departments along with a sales tracking system for only the sales department. The accounts department will also have their own accounting software which will be an updated version of their Pegasus software and the manager will also have access to a payroll system. For video conferencing the specialist advised the use of Skype due to its free ability to video call at no cost although there are paid options available.

### 1.2.3. Storage

Regarding the storage depending on the staff role there will be certain account restrictions on who can access certain documents and files (Refer to the Appendix 1.1.2.2 for network permissions). Client systems will feature 1TB internal drives and will feature 4GB of RAM which is double the current amount on the existing systems. The specialist has invested in 3 servers and one will be the backup server which will do regular backups every week to prevent downtime in the event of a problem.

#### **1.2.4. Security and Safety**

In general, all staff will be given a user profile with basic username and password security although passwords will need to be changed every month and will require to meet a password policy the company can decide on. The manager director wished for access to read only access to all files on the network while regular managers can have full access to all their departmental files. Clients will be restricted to their own files. Anti-virus software will be purchased to protect the computers once the network is connected to the internet. Staff login hours will also be maintained for the new network. To make sure the new network is properly secure an ethical hacker will be hired to do an analysis and evaluation. The overall building security will feature basic locks with keys that only certain staff will have especially to the server room which only managers can access. To ensure staff safety and to protect the cables the specialist decided trucking will be bought and installed for the cabling along the walls with sockets added in to provide for further computers. The cabling will be Cat6 UTP coaxial cabling that will be cut and wired to reach every client computer in the building. The specialist is hiring people to cut the cables and install them along with the trunking.

## **2. Aims of the Project**

The aims of the project are to address the issues stated in the problem analysis in the best ways possible according to factors such as installation efficiency, cost and time. Installing the new network topology and connecting everything together to prevent as much downtime as possible to the company is important hence people will be hired to assist in the installation.

## **3. Benefits**

The benefits of these solutions stated in the problem analysis are numerous. The new server based network will allow a more secure and more efficient way of sharing files since all updates will be synced for the next person who uses it to be freshly updated instead of needing to ask other staff or go adding their own work and having a only partly updated document which in turn leads to the probable issue the company currently most likely has of having several versions of the same document on different computers all over the network. Software will also be able to be shared as some products are sold to support more than one computer such as the anti-virus software as many providers offer deals that support several systems for a reduced fee compared to buying a separate version for every computer.

Upgrading the operating system to Windows 10 may cause issues with currently existing software and applications due to the software being recently released although many of the

applications being used currently by the company will be changed or removed during the upgrade and replaced with more up-to-date software while also being compatible although the specialist decided that a few or some applications may stay and will simply require an update or newer version to be compatible with the new operating systems. Some of the new software such as the anti-virus will feature the ability to share its protection on multiple systems depending on the package that is purchased resulting in overall lower cost on software for every computer. The computers chosen are prebuilt hence there should be no hardware compatibility issues unless it is peripherals such as keyboards and mice but as long as the latest drivers are installed there should be little hardware issues during the upgrade. The fact the entire network is being switched to a server-based form allows more compatibility when it comes to further potential upgrades in the future as new computers can easily be linked to the network and domain.

The increased response time through the network will be much faster than the current speed due to the new computers having increased RAM, newer operating systems and more modern or updated software will cut loading times and the more coordinated network infrastructure ensures staff can find their data more quickly.

The new operating systems and software chosen by the specialist are appropriate for the company as the new Windows versions won't require much help to use and staff will be able to find their documents as the environment will still feel familiar while being new and more modern. The same goes for the updated version of Microsoft Office for example as many features on the previous versions are still in memorable locations plus the new versions support cloud storage for further access to their data on other devices. New software being introduced to the company is also made appropriate for each department and if more than one required it, they will be able to access it.

Due to the server-based network hosting a domain server with roaming profiles anyone can look on any machine to view their work or any network resource which results in efficient working practices rather than being confined to one system. The company can agree on good working practices which keeps them ethical and will protect them if any staff decided to attempt computer misuse or attempt to breach the data protection act.

Basic training will be required to use the new computers and such staff will need to be trained to use new equipment that is added which also encourages efficiency. The company could advise staff on studying certain courses such as ECDL (European Computer Driving Licence) which will boost their skills in application use and promote them professionally in the workplace. Training the staff results in them feeling a sense of achievement personally and professionally which motivates them to work better and feel important to the company.

With the new network comes flexibility especially for the employees based off site as with the new internet access being installed it will allow these employees to access the company network files anywhere which prevents time wasting on needing to return to the building to

get certain information. This in turn will boost company efficiency and promote them as a business.

Regarding the company's clients with the new software a more accurate database can be created to store personal files which results in accuracy which also cuts down cost in storing hardcopy files. With the website available to the public it will reduce congestion over the phone due to ability to email the company or start a live chat with clients online, this in turn makes everything move along faster. Overall, the upgrade will improve the view of the company to clients and allowing it to potentially compete more against larger companies and perform better than other companies that have fewer modern systems.

With the internet as an option again all staff can decide when they decide to their work as it will be possible to do work at home and upload it to their cloud or bring in a personal device which can link into the network or computer.

Resource costs will be cut as less will need to be spent on paper and ink if everything can be access via the server. Despite the 90k budget for the upgrade the company will likely earn it back much faster than they would without upgrading.

Clients to the company will have a much better image of them if they can work efficiently, are contactable without delay which having the website and email system up will assist with. Clients will also be satisfied if issues can be resolved quickly as possible without error or postponement which the internet access can assist with.

Upgrading the computers to new models will provide more benefits now and in the future for the company as all computers will be the same operating system minus the servers which allows more clarity when it comes to maintenance and security plus the general fact about having new computers increases overall efficiency in business. With the installation of the hub and having internet access then the company can make more use of their domain name and the web developer can work on a professional company website that will open them to a wider range of potential clients.

Security will be vastly improved with the new network and an ethical hacker will be hired to test if the new security can be broken to ensure a tight, secure system that will protect client and staff information. The anti-virus system will be set to do daily scans to ensure staff can safely use their machines every day. Building security will be improved with more control over who can access what room by issuing keys to certain staff and only allowing staff to log in during the login hours. One of the new servers will also be storing backups in the event of any natural disaster plus the company will also have access to the cloud.

#### **4. Functional Requirements, NON-FUNCTIONAL Requirements and Constraints**

Functional requirements are essentials of what the company will need to operate while the Non-Functional requirements are the secondary features that can help further improve the company but aren't a priority requirement. During the project the specialist will encounter various constraints that will restrict him in certain ways regarding certain requests or limitations by the managing director or other basic constraints such as time.

#### **4.1. Functional Requirements**

Many functional requirements are included in the project such as the new servers to perform their tasks as the new domain server must function otherwise staff will be unable to log onto the system. The topology of the new server-based network is a requirement as it won't function correctly and efficiently if not setup in the correct manner. The new network will be featuring a star topology as it is designed with a central storage area with the access to roaming profiles so data is collected and shared from the server. The protocols in use by the company once the project is complete will be the TCP/IP (Transmission Control Protocol/Internet Protocol) to allow files and data to be sent over the network and internet. The company will be using ipv4 with a Class C subnet mask due to the companies' small size there is no need for a larger amount of ip's. The company will also make use of POP3 (Post Office Protocol 3) as they intended to have an email system in place and since this version is the best version currently it will provide the quickest email speeds. Information on the server will update and be stored for the use of staff who decide to view their work on another computer. The new computers added will be functionally required as the staff will require access to their applications to perform their roles which leads to media choice. The choice of media is important to be functional towards to company as it will feature the tools for the staff to perform their jobs correctly such as the video conferencing software is required to perform video calls and the web development software is required to develop the website.

The operating systems are required to function as the computers will not run without them and the hardware in place must be compatible with the proposed software. The security for the company is a very important feature as it will be the safeguard between theft, data loss and backlog within the company plus it will cause the company to become a breach of the current legislation acts such as the data protection act and the computer misuse act. The anti-virus software in place will do regular scans to ensure no viruses or other hostile malware gains access to the network, to also prevent this the internet will have restrictions on what staff can access if it deemed not appropriate for work. This in turn will prevent staff becoming distracted with other out of work issues. The backups that will in place for the company must function on a regular basis to prevent downtime during any mechanical, electrical fault or natural disaster.

Concerning staff security the company will go through a hierarchy so to speak as requested by the manging director that file access should be accessed by only those with the authority to do so such as managers being able to read and modify their departments work and the

staff being confined to only their own. The internet will be required for the new website to function and for the new server system to provide files and data to the off-site staff plus if users have cloud stored information, they will be unable to access it without the internet. Due to the project future proofing the project there is room for further expansion if required in future although the company will be able to operate fine unless required.

#### **4.2. Non-Functional Requirements**

Non-functional requirements will be the ability to improve data communications although this isn't required it would help the company perform more work in a smaller amount of time. To achieve better communications, using a good type of cabling such as fibre optic will provide very fast transfer speeds although this isn't required as the chosen cabling by the specialist will be satisfactory. Another non requirement would be the appearance of the company though IT as the appearance has no relation to how the company operates but merely will allow them to appear more professional within the industry and gain more customers. The IT upgrade will also allow the company to compete with larger scaled companies and perform better than other companies with less of an IT advantage. The move towards an upgrade also shows the company will willing to adapt to the industry moving forward and thus will give a good image of modern system and tighter security. The economic benefits of the project will save the company money in future as there be less need for any upgrades in the near future due to the specialist ensuring the project was futureproofed at the managing director's request. Training staff to further improve their skills should be an optional feature once the upgrade is complete although the specialist has decided on computers with newer but familiar operating systems and similar or merely updated versions of software the staff are currently experienced with. The media that is selected by the specialist is only functional until the point it does its job as there as many products in the market that do the same tasks the project chosen isn't important to the operation of the company although so may be better than others. Disc quotas could be considered a non-functional requirement as it won't truly impact the company but may affect storage issues if certain staff decide to use up all the disc space on a computer leaving none for other staff. The method of network access will either be wired or wireless hence as long as there is a connection both can work although the specialist has stated all computers will be wired there will be wireless options for other devices.

#### **4.3. Constraints**

Constraints are restrictions that can hinder the progress of the project and jobs hence the project will need to meet the deadline for the upgrade to be completed by which is the 00/00/2016. This will cause a constraint in the project and require all the new equipment installed, the software installed, updated or upgraded and working before this date plus all the hired people must have completed their jobs such as installing the cable trunking and the ethical hacker completed his analysis and provided his evaluation. The managing director gave the specialist a £90,000 budget to fund the project but if convinced is willing to provide more but as a professional it is better practice to stick to the budget as closely as

possible meaning the specialist must carefully decide what equipment, software and people to hire and make sure it isn't all going to end up being overpriced. Another constraint to the project will be the software as is it must be compatible and updated for use before the deadline as the staff will need to have access to it to resume their work and perform their training if the software is new. Each department has certain roles and require the correct software to perform these roles. The network must be completely setup and ready to use hence the domain must be fully operational and have the profiles for all the staff setup and secured with the correct permissions to access their departmental applications and the passwords must policy. The login times stated by the managing director must be kept as to prevent any potential crime during the evening or night. The internet needs to be fully operational on all the computers and the routers must be configured correctly to provide access for staff, clients and for the web developer to know if the website is working properly or not. The manager director stated that only the company managers and the sales staff shall be permitted remote access to the network hence their accounts will need more permissions. Other basic user requirements will feature fundamentals such as comfortable chairs and useful desks which will work in line with health and safety such as preventing eye strain while using the computers hence the chairs will be adjustable for staff of different heights. Regarding furniture the specialist has understood the meeting room within the building is currently empty hence will require similar furnishings plus the installation of smartboard will allow meetings to become much more interactive although this will add to the budget so it will be a constraint between cost and health and safety. The ability for staff to access their own devices on the network could also be considered a user requirement as some staff may decide to do work from home on a laptop, computer or tablet and wish to bring these devices into work to connect onto the network. Providing a wireless access point will be a useful optional feature for the staff and also clients if they come into the building and have information to share with the staff although there will need to be a security scan on devices before they can connect to prevent any viruses or malware getting onto the network.

## **5. Identification of Key Factors**

The key factors in the upgrade are *Hardware, Software, Design* and *Security* each all have an important element to the upgrade.

### **5.1. Hardware**

Referring to the analysis, hardware factors for influencing the project contain the existing computers that the company used as the Pentium 3 processors were becoming old and the fact most computers had only 1GB of RAM it would eventually be impractical to use those computers. The internal storage is not such a factor as 100GB can still store a lot of data but it is still in the specialist interests to increase the size to 1TB to ensure futureproofing. The new chosen computers will be able to meet satisfactory standards for the company and are considered more up-to-date preventing more upgrades in the near future. These computers will also be unlikely to be in need of repair although since the new computers are covered with a 2 year warranty this won't be a problem. The server currently in place is a cause for concern as the hardware for it isn't built for data storage it is practically a normal computer acting as a server hence it won't be efficient in its task. Similar to the current computers the server only supports a similar amount of storage space to the client machines which isn't advisable in the event any software and large files are stored on the server as it would become increasingly full and will reduce the overall performance of the system. The server would need to have often defragmentation scans if it were to remain. The client requested in the meeting that the specialist was to advise on the hardware in any regard to meet his requirement that the computers operate fast and efficiently.

### **5.2. Software**

The factors identified regarding the software the company has been using is a serious factor as all the computers featured a version of Windows XP according to the specialist it is very important to ensure an operating system upgrade is installed during this project as support for XP has ended meaning the computers will no longer receive updates to counter bugs and other flaws. The existing version of the companies Pegasus software is currently outdated and may have compatibility issues with a newer operating system hence an update to a newer version is required. The client requested the need for specific software for the company to function therefore the specialist has purchased new applications and updated existing ones. The fact there is currently no software in place to protect the computers from viruses is a factor as although there is no internet access, staff can still bring in external devices such as USB pens and external drives and potentially be infected with malware which would cripple the system. This would cause serious downtime as there is currently no anti-virus software in place to remove the malware. Due to the company having no central storage it means a technician would be required to go around every computer on the network and manually update any applications or install system updates which would be very time consuming and result in some computers being un-useable while their updates are downloading, installing and configuring. The new server based network will have the

ability to store applications and update them all at once saving a lot of time and the ability to schedule them means there is no need for any disruption during the day and doesn't mean a technician needs to remain in the building later in the evening or come in early just to update them. This would cut costs on the software in the long run and ensure all computers are all equally updated at once.

### **5.3 Design**

The current design of the network is a factor due to its peer to peer topology it won't function efficiently as stated in the analysis that there is no central storage so there is multiple versions of the same file on multiple computers. While it is possible to expand the network on a peer to peer topology it is unadvisable as with more computers would come more users with more documents on the network that aren't organised. The upgrade to a star topology is advised due to the server being a central storage area allowing one main location for data to be accessed also it is easier to configure and setup new computers on the domain when the time comes. Star topology networks will not completely fail if one system breaks down so there will be minimal affection to the company's work. The trunking purchased will scale the walls and in the ceiling floor to create an organised network for the cabling

### **5.4 Security**

The current security of the network is merely basic with user name and passwords to prevent unauthorised access plus the client mentioned during the interviews that there was no form of backups in place to protect them from computer misuse or natural disasters. The client requested from the meetings that the new computers be secure as possible, this will be possible with the new operating system's being immune to existing hacks that were possible on their previous system plus the ethical hacker will ensure the system is secure in his evaluation.

## **6. Resources, materials and available sources**

These are the resources and materials the specialist has access to in order to perform the project upgrade.

### **6.1 Procedures**

The project upgrade will feature many procedures that need to be adhered to in order to function in an efficient and ethical manner while keeping the law in mind. First the company must create a policy to cover staff for them to refer to for guidance when in doubt of what's the moral thing to do in a tough situation (Appendix 1.6.1.1). The policy will ensure all the staff follow ethical guidelines and will be less likely to accidentally commit a crime plus it will help staff to know what to do if there is unethical actions happening within the hierarchy for example in the sales department the sale manger tries to get one of the staff to sell something for more than it should be then that would be deemed unethical and the staff member should report this to the manging director to ensure order is restored. The accounts department could be contacted by someone outside the company asking a member of staff to sell them the details of all the other staff which again is unethical and plus would be an infraction against the Data Protection Act. This would damage the company's reputation within the industry and would be deemed unprofessional therefore a company policy is required.

Going more into detail about how the legislation acts can affect the company the Data Protection Act 1998 as stated already is vital to people's rights and therefore personal data must be kept secure as the exposure of such information can cause many problems for that individual but also to the company (Appendix 1.6.1.2).

Another important act to follow is the Computer Misuse Act which was designed to punch cyber-crime including accessing documents people should be able to or deleting important files APPENDIX 1.6.1.3. This act is especially important when it comes to this company due to their network being the project upgrade, all things must be considered if potential breaches of this act are caught. To guard against this, act the network and computer security is required as advised by the specialist, strong passwords that meet the password policy and a password change every month will reduce the likelihood of unauthorised computer access. There is a tactic known as Social Engineering APPENDIX 1.6.1.4 which could point back to this act and the Data Protection Act for an example in Crichton Memories case would be a member of staff is out and meets someone who they get along with although the member of staff is unaware the person is only trying to get to know them so they can obtain information that they can use from them to further their own gains. Basically, this tactic is taking advantage of peoples trust so it is important for all staff to ensure their passwords aren't something guessable or easily relatable to the person.

The Health & Safety at Work Act APPENDIX 1.6.1.5 is important in this upgrade as it is the employer's responsibility to ensure all their staff are working in a safe and suitable

environment as for example referring to the cabling situation the company currently has, the cables are known to be left lying on the floor which can cause staff to trip over them and cause themselves serious injury. People tripping over the cables will also damage them and cause more potential risks if they become worn or the wire inside is exposed, this could lead to more fatal accidents so ensuring the environment is safe to work in is a priority. To do this the specialist has purchased faster more secure cat6 cabling with a LSZH outer layer to protect against potential fires. The cabling will be stored along data rails in the ceiling and behind trunking in the walls.

The Equality Act 2010 APPENDIX 1.6.1.6 is also important to consider as this act states that companies need to cater the needs of all types of people regardless of age, disability or any other personal issue they have. This may not be a currently large issue but potentially in the future a new member of staff may join the company but is wheelchair bound and requires the access. To support this type of issue the lift will be accessible and the desk the user works at will be adjustable.

The Copyright, Designs and Patents Act 1988 APPENDIX 1.6.1.7 will be important for Crichton Memories as they must ensure their work is covered by copyright to protect it from outsiders using it as their own material, this could lead to a rival company or person taking advantage of the lack of copyright and providing a cheaper service.

The Waste Electrical and Electronic Equipment legislation APPENDIX 1.6.1.8 comes into play with the project upgrade as the specialist has decided to remove the old computers, to have an ethical view of the environment the specialist and company need to dispose of old equipment in a safe and eco-friendly way to prevent them being shipped away to foreign countries and be added to their overfilled hills of waste equipment. This results in poisonous materials in certain pieces of equipment coming into contact with people as they take them apart which can affect their health.

The Administration of the network APPENDIX 1.6.1.9 will need to ensure certain security features are in place as there are many ways to break into a network. The anti-virus may protect the company from viruses but it won't stop people trying to hack in.

Crichton Memories may wish to implement a computer user agreement for staff when they use their computers so if anyone breaks their policy, they will be subject to disciplinary procedures. This in turn makes the security of the company more secure in an ethical view and will promote professionalism.

## **6.2 Staffing**

### **6.2.1. Staffing during the project upgrade**

The staffing for hire to complete the project is first and foremost the Network Specialist (Appendix 1.6.2.1) brought in from NetSolutions to lead and guide the project. They have authority from the managing director as stated in the interviews that they are allowed to advise and decide on many features and directions the project can go. The next important person is the client in this case managing director as it's him who wishes for this project to take place, he has put the responsibility of most aspects to the Specialist although there are certain requirements he has asked for. The specialist will be able to setup the server network and ensure it is secure and safe to use.

Computer Technicians (Appendix) will be hired to help setup and install all the computers then connect them to the domain. The technicians will also need to configure the member's server to ensure data redundancy is in place via the RAID 5 setup (Appendix). This will ensure even if one partition fails the network can continue to function until the faulty drive is replaced. The company has specific permissions (Appendix) these will need to be input by the technicians.

To install the cable trunking on the walls and the data rails within the ceiling, joiners will be hired to ensure these are fitted properly. They will be responsible for physically taking measurements on the walls and making holes for the cabling where appropriate. The cabling within the data rails in the ceiling and with the wiring within the new wall trunking, Electricians will be hired to make sure the wires are correctly cut and assembled in a professional manner resulting in little waste of resources and time. (Appendix The joiners will only be required in the earlier phases of the project and will have completed their work to allow the Electricians in to start the cable cutting and wiring. The Electricians will likely stay until the project is complete due to needing to install the wall sockets for the computers and ensure they work.

### **6.2.2. Staffing once the project is complete**

Once the project is finished an Ethical hacker (Appendix) will be hired to do an analysis and evaluation on the network to test its security. This is in line with the client's requests as he wished for the new computers to be secure.

The current staff may need to be trained in various applications such as their newly updated word processing packages and their introduction to anti-virus. Some staff may also require a basic safe introduction to using the internet in the workplace which could be provided by a local course. Apart from additional training the staff should be able to resume their daily roles within the company.

### **6.2.3. Staffing for ongoing maintenance**

The company will have a subscription with DELL when the servers and computers are purchased, this allows for them to come in and repair any issues the next day.

### **6.3 Equipment**

The specialist decided that all the existing client computers will be replaced with much newer systems which are Dell Inspiron 3478 models featuring a 4<sup>th</sup> generation Intel i3 Processor along with 8GB Dual Channel DDR3 and a 1TB 7200 rpm SATA 6Gb/s Hard Drive. These computers (Appendix 1.6.3.1) will provide enough RAM to run more applications at once and run them much faster. The i3 Processors are fairly new and will last the company many years before requiring another upgrade plus the 1TB SATA storage will allow a large amount of data to be stored. The servers chosen are PowerEdge R330 rack servers (APPENDIX) which will be stored in a cabinet in the server room. These servers seem appropriate for the company as they are still a small company and won't require large servers. The way the servers operate will be through RAID 5 Striping (Appendix). The cabinet (Appendix) will provide plenty of space for expansion if required in the future and will also be responsible for keeping the servers taking in hot air from the top and letting in cool air from the bottom. The servers chosen will have three functions: Domain server, member's server and a backup server. The domain server will provide access to the company domain to which all staff can logon to their accounts. The switch chosen is a 48 Port rackmount switch (Appendix) which will fit nicely into the server cabinet, this will be used to allow the rest of the connections to wire through the building. The switch will be connected into the router. The specialist decided a wireless router would also be beneficial therefore a LINKSYS Wireless Router (Appendix) was chosen to provide an optional wireless connection for staff. The router will connect into the BT Home Hub 5 that was purchased along with a monthly contract to provide an internet service to the building. The previous printers were decided to be thrown out and new Epson all in one printers (Appendix) were purchased, the same number of printers will be bought but more evenly distributed through the building to allow more access. The new printers will be joined onto the network by the technician's hired to setup the new installation ensuring the latest drivers are installed and are useable from all the computers on the network. The final piece of new equipment is the projector for the conference room, this will allow the staff to show media on the wall or the whiteboard where it will be more interactive. Staff can use an external device and connect it into the projector if they are not going to use the computer in the room. The projector is small and compact allowing easy transportation to other rooms in the building.

### **6.4 Software and Services**

The client operating systems have been purchased with Windows 10 Pro (Appendix) due to it being the latest operating system with the latest updates and therefore being much more secure than previous editions. Windows 10 was included with the DELL computers so is likely cheaper than buying the copies separately. The server operating system will be running Windows Server 2012 (Appendix) as provided with the DELL servers purchased, this

is currently one of the most used operating systems for servers therefore is known to be reliable and efficient server platforms. Similar to the DELL client systems, the server operating system is included with the purchase resulting in lower overall cost.

The applications purchased are similar to the original applications to cut down on training when the company is active after the project. First, the specialist has decided to purchase Capital Gold Accounts (Appendix) provided by Pegasus to replace their previous version, this upgrade will support all the applications they currently use and will keep the staff motivated if they are using something, they have experience with. The Payroll package is also purchased by Pegasus (Appendix) for Beth only to meet the user requirement specified in the interviews with the managing director.

To upgrade their word processing applications, Microsoft Office 365 Home & Business was purchased to provide staff an up-to-date experience using word processing packages and prevent compatibility issues in future as the newer formats are featured in this package. The software is designed for business use therefore the price is good for all businesses to consider. The web developing software will be Dreamweaver CC which will feature the latest tools for web development, this will allow the web developer to create the company website faster and resolve errors more efficiently.

The Anti-Virus purchased for the company is Norton Security which offers a good price for 20 computers on the network. This software will provide real-time internet security preventing various data and locations on the internet from gaining access which in turn allows a more manageable and safer environment. The software can have custom schedules to install updates and perform scans. The application software provides licences to allow use on the systems which makes it legal for use otherwise if the company had an investigator in and it was discovered that non licenced software it would be illegal and would result a breach of copyright and would allow for prosecution.

## 6.5 Other Physical Resources

The furniture purchased for the company includes many new computer desks (Appendix) which allow for a comfortable computing environment allowing holes for cabling. The chairs are made to allow a user to adjust their height or back to meet their needs and keep in line with the equality act. The trunking purchased will scale the walls of most rooms and lead into the ceiling/floor to allow an organised layout of cabling which will also allow the power cabling and cat6 cabling to reach the ports and power sockets provided and fitting within the trunking. The server cabinet mentioned earlier is suitable for the servers purchased as it supports 18U which gives room for expansion and allows the switch to fit in easily. The cabinet is lockable to provide security and is described to be soundproof to prevent noise and disrupt workers. To provide the cabling, several coils of cabling (Appendix) have been purchased for the electricians to use to install along with the rj45 heads (Appendix) to allow

cables to be created. The trunking will be installed by the joiners and the main reason is to promote the health & safety at work act. The client stated that the building already has suitable air conditioning hence none was purchased along with the standard Co2 Fire Extinguishers to abide by health and safety laws.

## **6.6 Time in Class and Own Time**

To set about performing the research for the project I had to learn to manage my time due to the graded unit being a yearlong project it would sometimes cause me to lose time on it to other subjects. Using my time wisely in class I done research on all the requirements needed for the Graded Unit Planning Stage using my e-portfolio and Project Plan to stick to deadlines I set for myself.

## **6.7 Information Resources**

Various resources used to draw up a pricing plan for the project was due to using certain recognised companies and providers:

The hardware manufacturers I used was mostly DELL (Appendix) due to their high rating in the computing industry and their reputation for pricing good computers for good prices PLUS the website is a lot user friendly and it's easy to go back and make changes. The specialist chosen TP-LINK (Appendix) and LINKSYS (Appendix) because they are popular venders for networking equipment. The printers the specialist chosen is Epson due to them offering good printers for competitive prices. A main online retailer many things were purchased through was Amazon (Appendix) as they stock countless items of various types. BT was important for the internet service due to them being the main company in the UK that provides leased lines and connections.

Regarding the software, the Pegasus software was bought of their e-store (Appendix), this software was expensive but is distinguished in the industry and is familiar with the staff. The same is said for the Microsoft Office software as it is merely been updated to be compatible with the modern computers plus Microsoft is also distinguished in the industry as a whole. The anti-virus software was purchased of Norton's website which was very clear and user friendly in offering deals for businesses (Appendix) Skype was purchased of their website although the software is free for download business deals were on offer with monthly rates for businesses'. Other references were obtained via the scenario sheet (Appendix) and checklist.

## **7. Approach**

The approach to the project was done by regarding to the Life Development Cycle (Appendix). This works by first analysing the situation then working out a plan to deal with the problem. If in the process then allows steps to be repeated if any developments are encountered to make sure everything functions properly before proceeding. Regarding the e-portfolio, it was used to keep a steady plan on progress of the project and helped to stick to deadlines.

## **8. Project Plan**

During the start of the project I interviewed the client for answers to help with the investigation. After several meetings I was about to start the project properly setting milestones on each section of work to complete before the next could be started. To keep on schedule, I maintained an e-portfolio (Appendix). During the course units I described which units I decided would be useful when it came to doing the project e.g. Installation and Maintenance and Professionalism and Ethics. Once the course units were done, I began to describe the existing system using the information I gathered from the client over a number of weeks. Looking at the existing systems I was able to start figuring out solutions to the company's problems considering constraints the client mentioned during the interviews such as the 90k limit.

Once I managed to come up with solutions to the problems, I began to describe how they will benefit the company in the aspects of performance, cost, efficiency and security to convince the client the investments are worth the price. To ensure the essentials are covered, I started to explain how many of the improvements are functional or non-functional to the operation of the company and listed the constraints that were imposed up on me by the user requirements or the manager director.

Next, I began to focus on the ethical aspects of the company including the legislation acts and laws the company need to consider when upgrading. This ensured more security was flagged and that all potential risks were highlighted plus I advised the company to implement a company policy to help staff know what is ethical. I then advised on the other procedures such as server permissions and rules such as online security. Next, I priced the staff on completion of the job and described their overall roles while they would be employed to perform while at the company building.

I then went onto state and describe more in-depth why I picked the hardware I chosen along with the software and extra's such as furniture and chairs, trunking and cabling. I then listed why I selected the vendors and providers I picked for the upgrade to prove their credibility within the industry and that the investment was worth the cost.

The next feature was to explain how I used my time in class and free time to manage my report which I explained I maintained a schedule and an e-portfolio to keep on track along with the Gantt chart for the project plan.

## **9. Implementing the planned solution to the task & tracking the implementation**

With the client and the NetSolutions specialist agreed on the path forward with the upgrade, firstly the new equipment and applications must be correctly and properly installed and configured. This will include the operating systems for the client systems in each department along with the server operating system chosen for the central storage server. Once complete the new applications chosen by the specialist will need to be added and correctly shared among the staff with the authorisation to use.

The specialist has created a Main Distribution Frame (MDF) along with Intermediate Distribution Frames (IDF) to detail a physical layout of how the new network will function. This will detail all the devices and their connections. With the physical diagrams there will also be a Network Addressing Scheme detailing details such as internet protocol addresses, subnets, MAC addresses and other information to create a logical table of how all the equipment works. The specialist used an application provided by CISCO called Packet Tracer to create some of these frames and diagrams as using such software will ensure the planned setup and components will work or not allowing changes to be made before implementation. The specialist has detailed how the physical process of the installation will proceed which features device locations in each room or department plus their connections through the building.

Once everything has been implemented the specialist must now test his solutions which he will record in the form of a log book detailing what the test should result in and what it actually results in.

Finally, the specialist will explain how he managed his time to implement the time demanding stage of the project explained in project maps and the use of an e-portfolio system.

## **9.1 Installation and configuration of operating system and application software**

During the initial planning stage of the project, it was agreed between the client and specialist that the network was required to perform up to required standards of Security, efficiency and ensuring the entire structure of the network is future-proofed to prevent expense on more upgrades in the near future. The network preparation will be split into several sections between client and server operating systems and application installations. Many of these said applications will be installed via the domain to reduce man hours on individual installation on each client. Reasons for the choice of these applications have been well justified by the specialist and many of the applications can be viewed on their websites from references in the Bibliography. Many of the discussed applications will be subject to group permissions to ensure only the permitted staff are able to use the software the client has allowed them access to along with any user files. This is to ensure security and prevents staff from using their employment as an exploit in the security system.

### **9.1.1 Client Operating System & Applications**

The operating system is a vital part of an entire network as users will be unable to perform their tasks without the popular and user friendly graphical interface due to the difficulty of the command prompt and the efficiency of tasks done with a graphical interface is incredibly higher for certain types of tasks which the company will focus on mostly. The operating system chosen by the specialist will meet the requirements of the client and will be useable by the system requirements of the computers purchased. The installation of Windows 10 can be done via a clean install or via an upgrade from certain versions of Windows 7 and Windows 8.

#### **9.1.1.1 Operating System – Windows 10 Pro**

The specialist decided that Windows 10 Pro would be a suitable choice for Crichton Memories due to their previous history with Windows operating systems and the fact it's the newest version released resulting in many benefits. Firstly, the operating system is constantly being improved on by Microsoft to make features more secure and stable which will meet the client's standards of security and efficiency such as the latest security updates from Microsoft that aren't released on previous versions of the Windows operating systems. The operating system is designed to make the most out of the hardware available to ensure a smooth efficient process of using applications. Due to the specialist purchasing new computers with the operating system already installed this saves time in installing it on all the clients but if it weren't already provided the specialist would advise an unattended installation method to install on all the clients at once. This task would be performed by the lower skilled technicians hired by the specialist as little experience is required due to Windows guiding users through installation. Although the staff are familiar in part in using Windows they will still need to receive training on learning how to adapt to some of its newer features and learn new ways of doing tasks. This will be handled by local companies willing to host training sessions for various departments within Crichton Memories over the course of two weeks once the new network is operational to ensure all staff is familiar with the new software and has the skills they need to perform their role properly.

#### 9.1.1.1 Windows 10 Features

Windows 10 Pro is also more suited to businesses and has extra features included to support this such as the essential ability to join domains which is required for clients at Crichton Memories, this feature opens the ability for staff to access their central storage system and access their roaming profiles among other important features. One other example of why Windows 10 is a good choice for the upgrade is the ability to use remote desktop to allow other staff or external technicians perform software related fixes if required saving the need to travel and be onsite to fix the problem. This is especially helpful for staff that only may have a basic understanding of Windows 10 for their job purposes along with the provided training and won't be familiar with being able to perform any maintenance.

Finally, another important feature of Windows 10 Pro is its ability to be compatible with software on previous versions of Windows although due to it being the newest operating system some applications may not be supported. Regardless of this flaw running applications under different compatibility modes can usually combat the issue until proper Windows 10 support is provided for the applications.

Windows 10 in general has a lot of features compared to previous versions some of which support the choice to use the operating system at Crichton Memories. Windows 10 in general is offered as a free upgrade for any computers that previous was running Windows 8, 8.1 and Windows 7. This ties in nicely with the fact the computers purchased from DELL for the project have Windows pre-installed so it is in a sense free with the computers. Due to Crichton Memories previous operating system being Windows XP, an important feature of Windows 10 is the return of the start menu which was removed in Windows 8 and 8.1. The lack of a start menu would alienate the staff and require further training if Windows 8 or 8.1 was purchased as staff may be unable to locate their way around their client if the way they were always used to is no longer present. Windows 10 offers a new feature known as "Cortana" which is basically a digital assistant that helps users locate information and answer questions. Relating this feature to Crichton Memories would be a benefit for staff and improve their experience using their client as not only can Cortana locate information on the client, but also on the internet as well. Cortana reacts to voice commands also through a microphone which can save opening folders within folders and general searching all together as it can search for you and open what you require itself. Windows 10 Pro will be provided to all clients in the building therefore all departments will be using this operating system, only the servers will be an exception.

*Please refer to [Appendix 70](#) for further information on Windows 10's features.*

*Please refer to [Appendix 71](#) for further information on Cortana.*

#### **9.1.1.2 System Requirements & Installation**

The system requirements for Windows 10 Pro are easily supported by the Dell computers purchased as due to the nature of the upgrade, the specialist ensured futureproofing by selecting computers that will last for many years to come plus a new operating system which will gain the most attention from Microsoft in terms of updates to ensure ease of use and to provide the latest security updates. The minimal requirements are met and the computers have easily enough space to be able to install the software.

Windows 10 Pro can be installed via the supplied copy that has come with the prebuilt computers from DELL, to begin the installation the specialist should use the provided disc and product key to install and activate Windows 10. The installation will ask if the user wishes to have an upgrade or a clean install, this will be done as a clean install as the computers are brand new from DELL and have never been used before. During the process the user will be required to specify what size they wish the partitions to be which will dictate how much space each computer will have locally. While the computers have large 1TB hard discs this space won't really be required although the default size can be used in the event it becomes required. Windows will install the operating system mostly itself from then on although it will do a few reboots and ask the user for an email address if they have one although the clients will be using domain/local logons. The smooth and speedy installation will allow a quick start into the proper configuration unlike previous versions of Windows which require much longer installing.

*Please refer to [Appendix 72](#) for a clean installation guide of Windows 10.*

*Please refer to [Appendix 73](#) for more information on the system requirements for Windows 10 Pro.*

*Please refer to [Appendix 74](#) for information on purchasing Windows 10 Pro.*

### 9.1.1.2 Word Processing – Microsoft Office 365 Business Premium

Microsoft Office 365 Home & Business was the specialist's original choice for a word processing package but after review and further research it was decided that a better version would be worth using due to its contents including more of the client's requests.

Office 365 Business Premium was the specialist's choice for word processing software again due to their previous use of Microsoft Office; little training will be required for the staff to use the newer version and its applications. Office 365 Business Premium includes a wide range of features unlike the regular edition such as the provided email service and video conferencing which is also required for the network. In this version of Office all the features are installed and nothing is left out, each client will be able to make use of all of the word processing packages such as Word, Excel, PowerPoint, OneNote and Project with the cloud being able to store up to 1TB of file storage per user. The off-site employee's will also be able to make use of this as premium offers the use of online versions of Word, PowerPoint and Excel for use at their location of work and the cloud storage can allow this data to be saved and accessed on any other device with an internet connection. Premium also offers the service of a corporate social network which can be used by staff to communicate via other departments although the Pegasus Opera 3 Instant Messenger feature explained later on could also be used for this purpose. Along with the applications comes professional storytelling tools which would enable staff to create more interactive presentations during meetings. Microsoft guarantee people who buy their packages will be provided with a service level agreement with a 99.9% availability rate allowing Crichton Memories an incredibly small chance there would be any disruption to their service. Within the service level agreement comes an IT-level web service for help with issues along with a phone support service which is available for use 24/7 for serious issues. Microsoft also provide an Active Directory Integration feature to allow easier management of user information while also providing a world class security for data protection allowing Crichton Memories to be assured their data is safe if on Microsoft's cloud. All applications provided in this package are to be available on all client systems and every member of staff have the right to use this software.

#### **9.1.1.2.1 Microsoft Word**

Microsoft Word has been around for a long time and so several changes have been made to the application that would be beneficial to this project. Firstly, the menu system has been modernised allowing a smoother and easier way to navigate to folders and locations which in turn saves users time locating them manually. With these more helpful recent folders used, users can easily save their data on the central storage server for ease of access for themselves and other users in the company. Word like the rest of the applications within Office 365 is now more cloud friendly allowing an option to upload documents to the users OneDrive account freeing users to access their documents on almost any devices at any location or time as long as an internet connection of some form is present. Unlike previous versions of the application, Word now saves documents itself periodically over time to help users in the event the application closes down before they have completed their work. In the event this does happen the application can use this feature to save documents that haven't been yet saved properly by the user saving a lot of trouble retying. With the rise of the internet in everyday use, Word has adapted to this and offers users the option to share their work on blogs or email to other people directly from the application.

#### **9.1.1.2.2 Microsoft Power Point**

This application is vital to Crichton Memories due to staff periodically having meetings in the conference rooms, since the company have used this application before for creating presentations the new environment will feel familiar yet modern to users. Power Point has majority of the same features as the other Office 365 applications but since the application has been purchased with Office 365 Business Premium, there is the bonus feature of the ability to make presentations more interactive in meetings; this would make the meetings themselves more productive.

#### **9.1.1.2.2 Microsoft Excel**

Excel is an important word processing application used for creating spreadsheets to store information that can calculate changes based on data entered. While the company may make more use of Pegasus Opera 3 for this, the presence of this application is welcomed as it still can benefit the staff in their work. Excel like the other applications shares the modern features and will in turn benefit the staff with the familiar yet modernised environment within the application.

#### **9.1.1.2.3 Microsoft Publisher**

While probably not required for the upgrade, Publisher may be useful for the kind of work that Crichton Memories does. With the feature there along with the other applications the staff are never short for different applications to try creating work on.

#### **9.1.1.2.4 Microsoft OneNote**

OneNote may be a useful feature to Crichton Memories due to its ability to have documents held online to be readable for anyone who has the right to view them with an internet connection. This along with the central storage system can provide options for staff in their work pursuits.

#### **9.1.1.2.5 System Requirements & Installation**

The computers and internet connection will be suitable for this package although the specialist must ensure the internet browser of choice is updated to the latest version, also stating in the requirements is that all users must have a Microsoft Account to use the software which will require an Organisational account to be created which would be covered in the initial training session.

Upon completion of purchase, Microsoft will allow their software to be downloaded and installed although this may take some time depending on internet speed and quality. The software will be deployed via the active directory allowing not only the word processing features but also the video conferencing and business email features. To view more specific installations of the video conferencing or business email software, please review their respective sections of this document. The specialist will need to go through a tricky process of deploying the package to the clients as a regular group policy object distribution won't allow the software to link back to the source on the server; instead it will only deploy local installations which would need to be updated independently from each other. To perform the deployment the specialist must first create a share folder on the server before going to the Microsoft website and downloading the office deployment tool. Next, two XML files will need to be created to provide instructions to the system on how to install the package. The first XML file is used to download the required installation files to the shared folder and the second will be the configuration file. With the XML files created a command can be processed which will begin the local installation which may take some time as the file size is large. The XML files contain information such as the installation language, product id and the version of the software

which is important to know otherwise they will not work. While the files download the specialist can setup the logging path which gives a main location for all the client installations which is useful for troubleshooting. To ensure that Office is installed on the clients, the specialist will create a batch file that will run code to first discover if the software has been deployed or not. If not, the batch file will then run the installation from the deployment share location and notify the user when complete. The GPO will include all the users for this to work and so the batch file should be added to the “sysvol” scripts of each user for their installations. Once deployment is completed, the GPO should be unassigned as it will attempt to install the files again every time the selected users log in which would be irritating for staff.

*Please refer to [Appendix 85](#) for full details on application installation.*

*Please refer to [Appendix 86](#) for full details on client deployment.*

*Please refer to [Appendix 87](#) for full details on system requirements for Office 365.*

*Please refer to [Appendix 88](#) for full details on purchasing Office 365.*

### 9.1.1.3 Video Conferencing – Skype for Business

Video conferencing is a requirement requested by the client Skype for Business was included as a part of the Office 365 Business Premium. The specialist's original intention was to purchase this software separately although the new Office 365 package contains Skype and was therefore chosen due to all these applications being together and equally supported.

Skype is one of the most popular and widely known video conferencing applications in the world and while being free for many users. Skype for Business has advantages over the free version which while being cost efficient, doesn't have a professional image for a company that the premium version does.

The specialist picked this software for several reasons including its reputation as a solid service that would not disappoint the company due to the sheer amount of users it provides for, but also the reason it is supported by Microsoft hence the structure and level of service have high expectations. Since the application is provided apart of Office 365, it will fall under Microsoft's 99.9% quality of service guarantee.

#### 9.1.1.3.1 Skype for Business Features

While the free version of Skype supports around 20 people to join meetings, the business edition supports up to maximum of 250 users to join meetings on various devices such as tablets and phones allowing compatibility with every user. The quality of these meetings will fully feature good video and audio while also allowing web conferencing via the internet which allows users to set dates for meetings or they can start one whenever required. To join meetings with ease on any device, users can either click on the calendar date of the meeting with their mouse or if they use touch screen then touch the icon. The video quality will depend on the internet speed and quality but Skype for Business can support up to 1080p resolution and allow 6 users to be viewed via video at this quality at once in real time providing a high video conference experience. These video and voice calls feature a peer-to-peer *Voice over IP (VoIP)* methodology allowing communication over the internet. While the company has their central storage server in place along with features from Microsoft Office 365, Skype for Business also offers the ability to share content regardless of the distance allowing the sharing of content such as presentations created via PowerPoint. While many of the applications picked out by the client for this project, another feature of Skype for Business is the ability to use Instant Messaging also supported via Pegasus Opera 3 which will be explained later, this feature is a requirement for the project as internal communication is important to run the business. Staff from other departments needs quicker methods than the phone to send information to others in some circumstances hence instant messaging is vital in the views of the specialist.

Crichton Memories will be able to also access Skype via their default browser no matter the device type as all browsers are supported along with most operating systems including Windows 10 providing application compatibility. With the purchase of the premium package, Crichton Memories will have the ability to scale the software to meet their needs via the cloud or in-house servers allowing flexibility if more servers are ever required at the company in the future. This feature also links to the services Skype for Business offers for their users during a disaster, several architectural options are available to ensure the continuity for service to meet the companies needs in the event it may be required. Aside from Skype's internet presence, the software can also allow calls to be

made via the *Public switched telephone network PSTN* in the event there is no coverage of mobile data or any internet connection service available which can be an annoyance for the offsite employees. During the interviews with the client, the specialist was required to ensure the security of the network was improved during the project, Skype contributes to this requirement as it features built in encryption to provide all communications via the software to be much harder to crack by hackers. This service can be channelled and managed via the company's domain server by the active directory granting proper authorisation checks and proper authentication to users who are allowed to access the services, guests to the company building will not be able to use this software like many of the others purchased by the specialist. Microsoft understands the need for efficiency in businesses; hence Skype will be able to configure updates on a schedule along with the other software packages. Skype uses many protocols to provide its services, another of these is the direct *Session initiation protocol (SIP)* providing the speed required to start the communication calls be it video or audio. While this is useful, another useful feature is Skype has good interoperability when tasked with communicating with *Private Branch Exchange (PBX)* systems. Skype for Business features *Call Admission Control (CAC)* which will work to provide the best service for VoIP traffic. Finally, Skype for Business offers an alternate to virtual servers by offering network technologies that can work with a network to provide faster methods of new business requirements by shaping traffic.

#### 9.1.1.3.2 System Requirements & Installation

Overall, the computers purchased from DELL will have no issues handling Skype as the software requires very little in the way of physical hardware and is more internet and software determined for its quality. For the best quality of Skype it is advisable to have an internet connection with a decent speed and quality. The specialist has needed to ensure the correct equipment is also supplied to make the most out of Skype including web cameras and microphones to provide video and audio. Also, the Microsoft Silverlight plugin must be installed which can usually be optionally installed via Windows Updates.

To install Skype for Business it can be done separately or within one of Microsoft's Office packages, in Crichton Memories case it is a part of the Office 365 Business Premium package and will be downloaded and installed on all client systems via the active directory. Basically once the installation package is downloaded the install wizard will guide the user through installation although an account will be required to use Skype, this will be provided via Crichton Memories. Unfortunately, Skype for Business was removed from the rest of the applications in the Office 365 download package and must be deployed separately. The process is practically the same as the original Office 365 deployment except with the Skype for Business package which can grant more security to who can use it. Creating a batch file similar to the Office 365 version will also allow deployment of Skype for Business on selected clients.

*Please refer to [Appendix 85](#) and [Appendix 89](#) for full details on installing Skype for Business.*

*Please refer to [Appendix 90](#) for full details on client deployment.*

*Please refer to [Appendix 91](#) for full detail on system requirements for Skype.*

*Please refer to [Appendix 92](#) for full details on purchasing Skype.*

#### 9.1.1.4 Business Suite – Pegasus Opera 3

Crichton Memories require a business suite that provides several vital tools to assist in company operations and due to the company's previous history with Pegasus Opera, the specialist decided to stay with the software although upgrading it to the latest version. This will provide the staff with the same familiar experience they are currently used to while reducing the amount of training required to use the software. Pegasus Opera 3 offers an incredible amount of content for businesses although only the relevant packages that are required by Crichton Memories are mentioned in this document.

Familiarity isn't the only reason the specialist chose to pick Pegasus Opera 3, the software has a high reputation and professional appeal. Pegasus quotes "Opera 3. One System. One Solution" which means their software is a large framework of other applications that can work together. When purchasing Pegasus Opera 3 you will pay for the software but only the packages that are required allowing companies to grow and add new software packages when needed promoting flexibility and scalability.

The client requested in the initial interviews with the specialist that three types of software would be required to ensure the company can function properly: Purchase & Sales Ledger, Contact Management and Tracking System Software and lastly a Payroll system.

The specialist bought the Pegasus Opera 3 – Capital Gold Accounts as the default package for Crichton Memories although many applications are mentioned in this document the packages mentioned in this document are add-on packages the specialist has decided to buy to completely meet the client's requirements.

*Please refer to [Appendix 99](#) for full details on purchasing Pegasus Opera 3.*

##### 9.1.1.4.1 Pegasus Opera 3 - Financials Business Accounting Software

Specific software within Pegasus Opera 3 is required by certain departments within Crichton Memories hence multiple packages have been purchased by the specialist and the required package or packages for each department are to be deployed via the domain controller. The Purchases Department require the need of a Purchase Ledger while the Sales Department require a Sales Ledger and Pegasus Opera 3 provides several features and reasons to use their software. The Accounts department will be able to make use of many of these features within the financial package as it is stated within the interviews that the client requires the accounts department to have access to standard accounting software packages.

###### 9.1.1.4.1.1 Pegasus Opera 3 - Financials Business Accounting Features

The Pegasus Opera 3 Financials Business Accounting Software package offers both these departments their respective software plus extra useful features they may make use of. The Purchase Ledger features a secure procedure of all transactions from the start with the supplier until the end utilising BACS software to ensure the correct proceedings during automated payments. The software provides a dynamic freedom to view any purchase data from any period and in any manner of the user's choice. Within the purchase ledger is an invoice register that can track invoices and keep them in the register until the user authorises them providing further control over all

documentation. This feature also works closely with the Fixed Assets feature which allows records to be created and saved preventing the need to type in the details multiple times. The application can work with Microsoft Excel by exporting information from the ledger to Excel to print, this can be done with for example a document that features suppliers that have outstanding debts detailing the correct dates and other relevant information.

The sales department at Crichton Memories will be able to make use of the sales ledger system within Opera 3 along with its many features. Credit control is built into the ledger allowing a database of client information to be readily available along with the ability to project calculations for the companies and client debtor days automatically. The most generic features of the ledger is the general ability to email and copy information and view it in ways relevant to the user due to the Views feature which allows user customisation. The ledger is adaptable and has the ability to handle clients in other countries hence It can cater other currencies with ease. Along with the Purchase ledger, the sales ledger can project documentation and export it to Excel to print.

While the ledgers are the main focus for Crichton Memories there is a view other features that work along with them which are also useful and support the reason the specialist decided to choose Pegasus over other software.

The Financials package also comes along with a costing feature which allows easier tracking of costs while comparing them to set budgets, it can be made more user friendly by creating categories for different such as Stock or Direct Expense in Crichton Memories case. This feature can customise certain jobs, add or remove them and transfer the details to the Payroll application. Crichton Memories may do business with other countries within the EU so it is important to be updated on currency rates to avoid the change of rates affecting transactions, with the multi-currency feature this won't be a problem combined with Opera's EC VAT feature which helps businesses comply with the complex rules that comes with trading in the EU by having them built into the software. Finally, the fixed assets feature that was briefly mentioned earlier allows all company assets to be properly tracked while in business. If there is multiple assets that need importing, then the application has the ability to work with Excel and import the data into the Fixed Assets application.

*Please refer to [Appendix 93](#) for full details on the Financials package features.*

#### **9.1.1.4.2 Pegasus Opera 3 - Supply Chain**

While the ledgers and related software came from one package provided by Pegasus, the specialist decided the contact management and trading system will be created by two packages also provided by Pegasus to meet the client's needs. The first package: Pegasus Opera 3 – Supply Chain will feature majority of the software required to build a strong trading system for Crichton Memories.

##### **9.1.1.4.2.1 Pegasus Opera 3 – Supply Chain Features**

The specialist chosen this package for the project due to its amount of useful features that would help the company manage their stock and keep accurate records of the processing. The first feature that the supply chain package offers is the ability to manage stock in a more user friendly way. The ability to completely manage the stock allows room for more flexibility and security allowing the moving of stock when required to be tracked from the original location to the next plus the ability to

quarantine certain stock for inspection. The amount of stock is also important to be monitored and the stocktake feature helps the control system ensure how much of what the company has. This saves time when it comes to sales as Crichton Memories can be made easily aware of their supply levels and can quickly and confidently deliver orders on schedule leaving customers with a good image that delivery dates and estimates are accurate. This information also can help Crichton Memories know what they should focus on producing allowing less need in excess stock creating cheaper insurance cover due to a more balanced stock if a certain type is costly. The feature will also help improve sales as if used correctly; the company will unlikely run out of stock of a certain type required increasing the money made. Supply chain offers a bill of materials which records accurate information regarding the manufacture of products, current stages of batches of stock being produced. Assemblies can be created and customised with sub-assemblies to detail information such as what materials are used or just a basic description. Two good features about the supply chain package is it provides purchase and sales processing applications allowing the tracking of both purchases and sales dealings. These tracking and processing applications offer the ability to create unique documents detailing information such as price lists. The purchase application does a similar process it creates documents for the suppliers, with these applications working in real time with other packages a proper tracking system is formed. Finally, the bill of materials enables flexibility with the manufacture process by allowing certain orders to be elevated and allow one process to record the finished quantity and then record it into stock.

*Please refer to [Appendix 94](#) for full details on the Supply Chain package.*

#### **9.1.1.4.3 Pegasus Opera 3 – Business Intelligence**

The second package: Pegasus Opera 3 – Business Intelligence will focus on creating the contact management side. This will be a core package for Crichton Memories due to it being able to provide applications that can link the company together and provide information everyone needs and when they need it.

##### **9.1.1.4.3.1 Pegasus Opera 3 – Business Intelligence Features**

Opera 3's Business Intelligence package will provide the correct tools to properly manage a business and provide the information that everyone in any department requires. The first feature is Pegasus XRL which light mentioned earlier, allows Pegasus and Excel to cooperate with each other wither its Excel receiving information from Pegasus to print or Excel needing to access Pegasus for live data. This feature saves a lot of time that otherwise would be countless copy and paste actions which would be an annoyance for the users. Business Intelligence features a dashboard that can show real time business information as it happens, this feature can be customised with different formats and the ability to switch between data types. With this flexible feature it makes management much easier and allows users to act on the information much faster. The dashboards allow everyone their own dashboard allowing their own unique information to be displayed relating to their role for example people of importance such as the Managing Director can view critical information that relates to them while the Purchase Director can manage stocks. Another feature of Business Intelligence is the ability to use the Pegasus Instant Messenger application to allow quick communication throughout the building and towards the offsite employees, this can be a more professional choice to use although Skype can also be used for this.

*Please refer to [Appendix 95](#) for full details on the Business Intelligence package.*

#### **9.1.1.4.4 Pegasus Opera 3 - Payroll & HR**

Payroll is a vital feature required for any business due to the need to pay staff properly and on time for their work. It must be secure to keep the details private to avoid tempting staff to move to other companies if their pay rates are better which can cause competition to get ahead. The specialist was required to make sure a payroll system was included in the project upgrade. Pegasus offers modern payroll software with multiple features which allows it to be among one of the best types of software of its kind.

##### **9.1.1.4.4.1 Pegasus Opera 3 - Payroll & HR Features**

The software features many applications although the majority of this package will be limited to only to one employee of the Accounts department; the software is there for any future staff to join the company. This ensures future proofing throughout the department and company as all the packages purchased are the latest version and will won't require further updates for many years.

The payroll package allows multiple users access although in Crichton Memories, only Beth will have the correct authorisation to enter her password and username to use the software which is also authenticated by the active directory within the group and member privileges. Beth will be able to use the complete integration support to access other parts of the Opera 3 software that she requires. Beth can create a "Company" in her case Crichton Memories and add all the employees to it so she can organise their pay easily with her choice of periodic payments such as monthly or weekly without needing to separate them. The application allows numerous designs to apply to the choice of stationery Crichton Memories decides to use allowing flexibility during stationery purchasing. The application can also retain the details of up to a maximum for 999 payment periods allowing a good accurate pay history allowing reprints of previous periods to be done at any time required. Beth will also have access to a detailed employee record system for efficiency and the payments can be done by BACS allowing staff to be paid quickly when their due without delays due to processing. Pensions can also be full managed for all employees and the backup system of information is easily restorable via a built in facility.

Only Beth Scrimaeour, one of the accounts employee's has access to this software. This is because it is her role within the company to manage the pay of the other staff while performing her regular job in the accounts department.

*Please refer to [Appendix 96](#) for full details on the Payroll & HR package.*

#### **9.1.1.4.5 System Requirements & Installation**

The system requirements for Pegasus Opera 3 are dependent on several factors. Firstly, it depends on the operating system used and in this case Windows Server 2012 is supported and the servers have enough storage space and RAM to run the software. The client systems also have the capabilities to run any of the applications which would be access via the user's domain profiles.

The installation of Pegasus Opera 3 will be done via the member server through a client-server application installation. This will make it easier to deploy the specific software required for each department. The software will be purchased from calling Pegasus to arrange purchase of the base infrastructure and further add-on packages like several discussed in this document can be added on easily from the store. Upon delivery, the Pegasus software will be set into two installation discs. The first step of installation is to install the server disc onto the server which will host the software, this will allow the client software disc to be used when installation is done on client systems.

Using an account with administrator rights, the user must use the server installation disc to begin the process on the host server. The installation may require certain extensions to work correctly so the user should ensure they are all in place first before beginning. Once ready and the disc is in, the installation wizard would appear which will begin the installation. The user must have the activation licence ready that came with the disc delivery otherwise they won't be able to use their software. Once entered the installation will add the required files and register edits required to function hence the reason this software needs to be installed directly onto the server. Next the user must simply follow instructions provided on-screen and the server setup should be complete.

The technicians will now be able to go around each client and install the client software via the client installation disc. They will need to locate the server file share location and navigate through various files and alter details to make it ready for use. To prevent staff gaining access to all the software at once, each user will be added groups and sub groups which will restrict specific software to their domain accounts.

*Please refer to [Appendix 100](#) for full details on the distribution of software packages.*

*Please refer to [Appendix 97](#) for a full guide on the installation of Opera 3.*

*Please refer to [Appendix 98](#) for full system requirements.*

### **9.1.1.5 Web Development – Dreamweaver CC**

Dreamweaver CC was the specialist's choice for the web developer software due to their previous history using older versions of Dreamweaver allowing just an upgrade to satisfy the client's needs saving money and time on training in other application software for web development. Only the Sales Manager will have access to this software and thus will be limited to only his personal account from the active directory. Since the client wishes to expand his business online, a website would be attractive to more customers hence proper software is required to create user friendly and Dreamweaver CC has the tools for this.

#### **9.1.1.5.1 Dreamweaver CC Features**

Firstly since creating a website isn't as simple as writing regular documents, the user may need training in further use of HTML or other coding languages to make the most out of this software which can be provided by Lynda Courses. The software supports the use of many different coding languages suitable for different needs but there are also more user friendly tools for use to create website features. The software provides two views: Code view and live view, having both these is useful so the user can see how their new code is affecting the live design and can prevent errors before going too far into the project. Adobe offers users of Dreamweaver CC the wide range of resources from their creative cloud allowing a near limitless range of possibilities with graphics, designs and colours. Since creating websites can be tedious and may require changes further back in the process, Dreamweaver supports the user allowing them to update any existing element they may have used previously to save them manually doing it again. The libraries make it simple to manage multiple designs in case several projects are happening at once. This feature will be useful to the Sales Manager due to his responsibilities and likely time limitations due to his other work to spend on the website design. Dreamweaver CC features use of the currently latest bootstrap framework allowing compatibility with any browser of the user or customers liking and is adaptable to any devices screen size and view. Having such a flexible website will show a strong sense of professionalism and will be able to attract more online users regardless of their devices.

#### **9.1.1.5.2 System Requirements & Installation**

Regarding Crichton Memories new systems, Dreamweaver CC only requires a minimum an Intel Pentium 4 so the DELL Intel i3 workstations will work well as the software is also compatible with Windows 10. To make Dreamweaver run efficiently, at least 2GB of RAM is required and a monitor that can support a 1280x1024 resolution. Since the specialist bought this software online from the Adobe website, the software will be downloaded on purchase and may require an internet connection to access the cloud features.

To install Adobe Dreamweaver CC, the user must navigate to the installation file downloaded via the Adobe website after purchase. Once they open the application the application will ask if they have purchased the software or wish to try it, in this case the purchase has been made so choosing the purchased method will likely ask the user for the activation code to continue. The user must remember while during the setup to ensure all language settings are set to English – UK before proceeding. Once done the application will go through the installation to install the software. Once installed, the user will be able to use the software. The wizard will ask the user for a project key usually before this can be done which would be provided on purchase.

Since this application is only going to be used by one staff member, there is no need to deploy it through the domain server via a GPO. The specialist will install the software on the web developer's computer via a direct download. The restriction of this software to the Sales Manager is a requirement from the client so the specialist believes the most simple way to keep the application strictly away from the other staff is to only install it on the Sales Manger's client workstation.

*Please refer to [Appendix 101](#) for full instructions on the installation of Dreamweaver CC.*

*Please refer to [Appendix 102](#) for full system requirements.*

*Please refer to [Appendix 103](#) for details on how to purchase Dreamweaver CC.*

### **9.1.1.6 Business Email – Microsoft Outlook**

Microsoft Outlook comes along with the Microsoft Office 365 Business Premium package and thus provides a professional email system along with the other applications saving time and money on finding a separate service. Outlook is used by millions of people around the world and although the service is free to the public to use, Microsoft offers a version of the service that offers further features for businesses. The email system is also a part of the client's requirements for the project. Having a business email system is vital for any business that wishes to further their communication methods beyond the phone as while email has been around for many years now, the services it offers is ideal for businesses that require the sending and receiving of documentation. The features of Microsoft Outlook purchased with the business premium package offer several special features.

#### **9.1.1.6.1 Microsoft Outlook Features**

Microsoft offers further storage space in their paid version offering up to 50GB per user allowing more than enough storage for a business email which may gain a lot of emails daily. Crichton Memories will make much benefit from Outlook due to the ability to include the company domain name in their emails allowing a more professional appearance to recipients. Outlook has the ability to sync several types of information on all your devices such as calendar dates and numerous peoples email address and other details to ensure you never miss an update. Calendars can be shared among others to allow others to see if you're going to be preoccupied or free, this feature would be useful for staff at Crichton Memories as they can find out if any other staff are due to be in a meeting or other arrangement. To ensure security which would be a vital feature in this scenario would be Outlooks feature to erase your data from a device you have misplaced or was stolen; this would protect company secrets without needing to go to extreme efforts. Emails can be uniquely customised so Crichton Memories could create a unique template for their staff to use in their emails along with the domain name tag improving the professionalism appeal. Microsoft's guarantee is that their services is 99.9% likely to be available and secure 24/7 plus Outlook has a built in feature to admin your security so you don't need to allow more time emailing and less time clearing spam emails due to the anti-spam filter or securing your account in general. The admin centre has the ability to reactivate accounts and deactivate them which will be useful for staff coming and going from Crichton Memories as if staffs leave the account can be deactivated or if they return it can be reactivated. The feature also allows the creation of new accounts.

#### **9.1.1.6.2 System Requirements & Installation**

The system requirements for Microsoft Outlook is foremost an internet connection but beyond that the same requirements are featured in the appendices referenced below.

Installation will follow the same procedure as other applications in the Office 365 software pack, although most of this content is used online and will be available to users once their Outlook account is ready. Deployment of this software is covered with the Office 365 application package and was therefore not removed to be a separate installation like Skype.

*Please refer to [Appendix 85](#) for Installation of Outlook.*

*Please refer to [Appendix 104](#) for the configuration of Email.*

*Please refer to [Appendix 105](#) or Appendix 88 for details on purchasing Microsoft Outlook.*

### **3.1.1.7 Anti-Virus – Norton Anti-Virus Small Business**

Anti-virus software is vital to anyone who intends to enter into the internet and expect to be safe doing so hence the specialist was required to find a strong and secure form of security software and his choice was Norton. Due to Crichton Memories small to medium size, it is likely people will attempt to breach security now they are present on the internet which is a threat to company secrets and general structure of the network. The software focuses on protecting users browsing the internet in the event they wish to access a certain website, Norton may warn them if the site can be trusted. This can help teach staff what type of websites to look out for and what not to visit which would be a good help besides their training. Crichton Memories can setup a scan schedule to scan all client systems to locate any unwanted viruses that may have been accidentally downloaded and ensure the software is updated so often as possible without causing disturbance to staff. The specialist chose Norton Anti-Virus Small Business due to Norton's reputation for extremely strong internet security and scanning features.

#### **3.1.1.7.1 Norton Anti-Virus Small Business Features**

Norton stands out in the anti-virus market due to its top tier security allowing Crichton Memories to process with business as they normally would do without worrying about security. Under Norton's licence, everything will be protected regardless the software is designed to be compatible with any operating system or device. Security is vital although Crichton Memories have a lot of devices so staff will be able to pick which devices they wish to have protection, regardless of the amount of devices more licences can always be purchased as the company expands and grows. This feature allows Crichton Memories to only spend what they use on the software and not a pre-set subscription and remove or add more licences as they see fit allowing more money to be used on the business. Slightly like other software the specialist chose, Norton features cloud services as most online applications do these days. Norton will be managed by the company but ran by Norton allowing less installation and management in-house and more time configuring user's needs. Norton provides 24/7 service allowing any issues to be resolved by any member of staff that experiences them by qualified technicians and if any devices are stolen or lost then Norton can remotely lock them from use allowing further security until found or replaced.

#### **9.1.1.7.2 System Requirements & Installation**

The requirements to use Norton Small Business are easily met by the DELL systems but an internet connection is required to download and install the software. The software will be deployed onto the client systems via the active directory.

To install Norton, the user must purchase and download the software before following the installation wizard through the process. Each device that has Norton installed will use a licence which will allow activation once the software has been deployed onto each client, more licences can be purchased if required.

Deployment to client systems will require the use of a GPO. The specialist will need to use a managed client installation otherwise the clients will be independent from the server and won't be receiving updates at the scheduled time. The package should be put into a folder share that the

clients can access. Now the GPO must be created but the specialist must ensure the DNS is properly configured otherwise the process will take much longer than usual. Testing should be conducted with a few users before proper deployment to ensure everything is working properly. Once the specialist has ensured everything is working, all the client workstations should be added to an organisational unit for deployment.

*Please refer to [Appendix 106](#) for full installation details.*

*Please refer to [Appendix 107](#) for full system requirements.*

*Please refer to [Appendix 108](#) for full details on client deployment.*

*Please refer to [Appendix 109](#) for full details on purchasing Norton Anti-Virus.*

## 9.1.2 Server Operating System & Services

This section will mainly focus on software that will be featured within the server as many important features that affect the company will be setup and managed from there. The server operating system is almost like the heart of the network as many vital services are ran on this operating system. While applications were discussed in the previous section, many of the software applications mentioned will be installed onto the domain server to be deployed to the clients.

### 9.1.2.1 Server Operating System – Windows Server 2012

For the client to be able to control a network the most efficient way is to use a server and therefore the types of operating systems best suited to these tasks are server operating systems. Windows Server 2012 was the specialist's choice in this case due to the fact previously, only a regular client operating system was used on the server system which isn't advised due to the lack of features that Windows Server 2012 provides. Windows Server 2012 will be installed on all the servers to provide consistency with operating systems like the clients which prevents the need of different rules and methods to manage each one. The Domain Server is the most important server and thus needs the server unique features to ensure the network is ran to the best of its ability. The domain will be hosted from this server and so it will be up to this system to ensure it runs efficiently and has as little downtime as possible. Through Server 2012 is how most software for the staff will be deployed for installation and used via their domain logins and so it's important to perform their jobs to keep the company going during and after the project. All the servers will have Windows Server 2012 R2 installed on them back at the specialists place of work to prevent disturbing the staff currently working on the older network back at the Crichton Memories building.

#### 9.1.2.1.1 Windows Server 2012 R2 Features

The specialist chosen Windows Server R2 for several reasons mainly its benefits and restrictions to what operating systems are compatible with these servers. To keep in line with the client operating systems, the specialist decided to just select the most useful and up-to-date version of Windows Server 2012. The most important feature of this operating system is its ability to provide resources to users of the domain and manage them easily. The operating system is designed to be cost effective on power while allowing high performance and can utilise the cloud if Crichton Memories ever choose to do so. The operating system provides top tier recovery options to protect the system from power cuts or outages. Once setup as a domain controller, the domain server will be able to host the company domain and assign domain client profiles with multiple options for each. The server allows the user to add extra features to the server software to perform more tasks such as adding the active directory and domain services to create the domain and provide accounts to the clients over the network. This feature can also add the group policy management console to allow further editing of the policies and rules that apply to the network.

*Please refer to [Appendix 84](#) for purchasing Windows Server 2012 R2.*

#### 9.1.2.1.2 Windows Server 2012 R2 - System Requirements & Installation

The DELL rackservers purchased by the specialist can efficiently make the most out of the operating system with their i3 processors and large amount of storage space and with the ability to support up to 64GB RAM, the specialist believes these servers will make the most out of this operating system and other software. The requirements for Server 2012 depend on the version as some offer more features than others and thus require more resources to run. In this case, the operating system will run efficiently on the chosen rackservers provided by DELL.

Firstly the server's operating system must be installed on the server machines back at the specialist's place of work to configure after inserting the provided installation disc. Once the installation disc is inserted, the user must ensure the system boots from the disc to initiate the installation process. Once booted the installation wizard will appear and ask for the location related details such as language. The user must ensure during this installation the keyboard and language settings are for English – UK and not US as British keyboards use a different key layout, the currency would also be set to Pounds Sterling. Next the wizard will ask what type of installation is required, for Crichton Memories a clean installation will be done and will be installed on the primary partition. The installation wizard will ensure the installation goes properly and the operating system will be ready for use. The user must also remember to activate the software with the provided product key. The user also remember to always check for the latest updates from Microsoft as these can contain new security updates and bug fixes to know issues.

*Please refer to [Appendix 75](#) for installation of Server 2012.*

*Please refer to [Appendix 76](#) for full system requirements on Server 2012.*

#### 9.1.2.2 Windows Server 2012 R2 – Domain Server

The first server is the domain server which will be used to manage much of the network and its resources plus ensuring security. The domain server will be able to manage the users, groups, policy settings and other permissions that will need to be configured. Domain servers are used to manage networks meaning most clients using a domain are dependent on it for resources or other data provided via shared folders. This is a contrast to the existing workgroup style network that Crichton Memories currently utilise which has no central storage allowing complete independence per client. The client detailed his existing peer-to-peer network was starting to become slower after more users were added, this is likely because since every client has independence for each other it takes more strain on the connections and file storage.

#### **9.1.2.2.1 Configuring a Domain Controller (DS)**

The first step is to add the domain service to the server via a similar process of how the active directory service was added. The user must go through the server management console to add new roles and features to select the domain controller service after defining which server this service will be applied to. Once selected, the user will be asked if any additional tools are required before asking to confirm their choices before installation. Now that the service has been added, the server can now be “promoted” to a domain controller server. To do this, back in the server management console will be a new option to promote it to a domain controller.

*Please refer to [Appendix 77](#) for details on installing a Domain Controller*

#### **9.1.2.2.3 Active Directory (AD)**

Active Directory is a vital part within the server operating system as it manages the roaming profiles that will be assigned to the clients. It also is used to manage and configure several other features and software such as the applications that the staff will be using for their daily work.

Before active directory can be installed, there are several requirements before the user does so. Firstly, the user must ensure the server is connected to the network and has the correct TCP/IP addresses set along with the DNS address. Next, the user must also ensure the storage drives that are used to store information for the active directory are the correct format which is NTFS; this is mainly for security purposes. The final requirement is that the user account doing the installation must have administrator rights as this also is a security precaution.

The installation can begin once the user goes to the add roles and features location within the server manager, here the user can add more services if they wish. Next the user will be asked which server they want the service to be installed on; in this case it will be the same server. Selecting Active Directory will also ask the user if they wish to install any extras which may be required. Once the user has selected all the extra tools and features they wish to add then they can begin the installation once they confirm their choice.

*Please refer to [Appendix 78](#) for Active Directory Installation.*

#### **9.1.2.2.4 Group Policy Management Console (GPMC)**

The group policy management console is a tool that is used to view and manage all the policies, organisational units and group policy objects. It will be used to alter and change specific rules that can range from access privileges to basic notifications. This is the console that will be used to change the rules on what notifications clients will see, determines lockout policy and can prevent use of certain applications.

To install the console, the user must go through the same process used to install the active directory and the domain services features. Referring back to the installation of the Active Directory will give an insight to the process. The user can install this feature during the installation of other services to save time if required.

*Please refer to [Appendix 79](#) for the installation of the group policy management console.*

#### 9.1.2.2.5 Dynamic Host Configuration Protocol (DHCP)

Dynamic host configuration protocol is used to automatically configure networked computers with the correct addresses without the user needing to do so manually. The specialist decided this method would be faster for setting up the network than assigning each individual workstation a static address.

Installing DHCP is like installing any other service on a server, the user must go to the add roles and features location and select DCHP server before going through the additional features interface and the confirmation of their choices. The specialist must ensure that the system has a configured static internet protocol address in place to allow DHCP to function properly. Typically a system reboot will be required to properly install these services to be ready for use. Now that the service has been installed the specialist will need to create a new scope to allow a range of internet protocol addresses that can be assigned to the clients workstations. To do this the specialist will need to go into the DHCP console and setup a new scope, this will be used for the workstations in the building that join the domain. When the new scope wizard opens the specialist will need to name the scope to show its purpose, in this case it is for the workstations. The range of addresses will then need to be decided to allow for all existing workstations and enough for more if required in the future. Next the lease duration will need to be decided, this is the length of time the device has the address before being assigned another one. Once all details have been decided then after the scope is created, all new clients on the domain who have DHCP enabled will be assigned an address automatically. Once configured the specialist will need to go onto the each client and ensure the IPv4 settings is set to obtaining internet protocol addresses automatically along with obtaining the domain name system address automatically.

*Please refer to [Appendix 80](#) for DHCP installation.*

*Please refer to [Appendix 81](#) for DHCP Scope configuration.*

#### 9.1.2.2.6 Domain Name System (DNS)

Domain name system is vital to a network as it is used to be the service that converts website names into internet protocol addresses. For users wishing to visit Crichton Memories website, they will be typing in [www.memories.co.uk](http://www.memories.co.uk) but in reality this service will be translating this text into an address which will redirect the user to the location.

To install DNS, it is done the same way as the other services mentioned in this document. DNS is one of the first services that should be installed although the server will automatically install it for the user if it is required when installing another service that requires it.

*Please refer to [Appendix 82](#) for DNS installation.*

#### 9.1.2.3 Windows Server 2012 R2 – Member Server

The member server will be used to host the central storage area for the whole network. This is where staff will gain access to shared documents that are accessible depending on permissions granted via the active directory. Many applications that are deployed to clients via the server will be done from here hence the member server will also be utilising the RAID 5 methodology for system backups which will be explained later.

#### 9.1.2.3.1 Configuring a Member Server

The first step to configuring a member server is a basic installation of Windows Server 2012 R2 again supporting a GUI for administration ease. Once the installation is complete the server must be connected to the domain and ensure it has the internet protocol and domain name service addresses entered correctly otherwise the domain will be unreachable. Once ready, the server can be connected to the domain which will require administrative rights to allow authorisation to join. Once joined, a reboot will be required before the member server is ready for use. The installation of applications for deployment should be created and installed with correct folder shares in place.

*Please refer to [Appendix 75](#) for basic installation of the member server.*

#### 9.1.2.4 Windows Server 2012 R2 – Web Server

The web server has been upgraded from the previous version at Crichton Memories to be faster and support more features with Windows Server 2012 R2. The web server was previously a regular client workstation featuring IIS which the specialist didn't find an efficient way of operating a web server. His suggestion was to add a dedicated server supporting Windows Server 2012 R2 featuring the IIS service.

##### 9.1.2.4.1 Configuring a Web Server

The web server is the easiest server to configure as it has the least required services to work. Firstly like the previous two servers, the operating system must be installed with a GUI and connected to the domain before it can be of use. Next the specialist must connect this server to the domain like the others before adding the IIS service. With the service installed the server can now host websites for Crichton Memories.

##### 9.1.2.4.2 Internet Information Services (IIS)

Internet Information Services is a group of services and protocols that are used to host websites. Crichton Memories will implement this service on their web server which will allow their website to be hosted onto the internet for people to view. The service also allows the editing of websites which can co-exist with the Dreamweaver CC application. To install IIS, the same procedure is done like the other services, the specialist must go into the add roles and features and install IIS from the list. Unlike other services, a reboot isn't required.

Please refer to [Appendix 75](#) for basic installation of a web server.

Please refer to [Appendix 83](#) for IIS installation,

## **9.2 Installation and configuration of network nodes**

In this section, the layout and assembly of the hardware devices are explained along with how the networked devices link together and work. Firstly, the hardware requirements and specifications for purchased equipment will be explained followed by how everything is physically positioned in the building. Once explained, an installation guide for each type of device will be summarised and the justification to why the specialist purchased these chosen devices will be stated. The specialist has created an updated spreadsheet of costs regarding the pricing and costing of equipment based on feedback from the client after initial planning which can be viewed in the Appendix section. The network addressing scheme table will also be featured in the appendices which will detail all the internet protocol addresses for each device in the building along with other required information.

Please refer to [Appendix X](#) for a MDF diagram on the cabinet layout.

### **9.2.1 Servers – Installation and Configuration**

Crichton Memories will need to be able to utilise a central storage system, web services and a place to manage their network so it can be effectively used. To do this, the specialist has suggested that three server systems be added to the network to cater these needs.

The servers purchased from DELL will feature a rack design allowing them to fit into the purchased cabinet along with specific other equipment. The specialist chose the Dell PowerEdge R330 servers for their entry level specifications and their small 1U size which saves space in the cabinet allowing cost efficiency. Another reason for the specialist's choice is due to the features that Dell offered to provide if selected during the purchase of the systems. During the customisation of the server units, the specialist was given the option to include multiple features that would otherwise cost much more time and money. Firstly, the servers can provide huge amounts of storage space with the Terabyte SATA internal drives which will provide massive amounts of space for applications and large files along with the RAID 5 backup system which will allow a strong form of fault tolerance.

The servers will be positioned into the cabinet then will be connected to the wall via their power supplies along with the RJ45 connector cables feeding into the back of the servers. These will feed through the patch panel and then will connect to the switch before finally connecting to the router which connects to the ISP and the rest of the network. Before the server is properly assembled in the building the specialist will need to have all the required equipment delivered to his place of work for assembly. The specialist or whoever he assigns to configure the server must ensure the correct equipment is physically installed on these servers such as RAID 5 for the fault tolerance.

Once ensured all physical elements are in place the specialist should begin to connect the server to a monitor to allow a view of the operating system installation. With a mouse and keyboard connected the system can be configured to the base level which will now allow services to be implemented as explained in the previous section. Each server will be configured with a different function but all will be physically installed in the same fashion. Once all services required are configured, the specialist must then begin configuring the internet protocol addresses and other related information to allow connections to be established between other devices such as the client workstations and other servers. The servers will be given static addresses along with the router and printers. To view the configuration of services, please review the Server Installation section. Once the operating system and services are in place the specialist should power down the servers to begin connecting other

cables such as the Ethernet cables which will allow a connection to the outer network. Servers generate a lot of heat and need to be cooled to prevent overheating which can lead to the system shutting itself down. This needs to be avoided to ensure the network can remain constantly operational hence the specialist has purchased some fans that will be inserted into the cabinet to provide cool air for all the equipment. Also with servers is the ability to keep them operational during a loss of power in case important data is lost if they shutdown. The specialist has purchased a UPS to provide power to the server for a limited amount of time to allow administrators to ensure important tasks are completed or cancelled along with any unsaved data being saved before powering down.

Please refer to [Appendix X](#) for a print screen image of the server unit.

Please refer to [Appendix X](#) for a physical installation of servers into rack cabinets.

Please refer to [Appendix X](#) for an IP Numbering Scheme.

### 9.2.2 Workstations – Installation and Configuration

For the clients to perform their duties to the company, they will need workstations to perform their roles and to make use of the applications purchased for them.

The workstations for the clients will be delivered to the specialist's place of work to undergo configuration and installation before being physically positioned in the Crichton Memories building. The DELL Inspiron 3847 systems were chosen by the specialist for their specifications along with the price and will enable clients to be able to use their new software more efficiently with the increased RAM allowing more applications to be run at once and the processor allowing faster general experience.

The systems merely need to have their operating system installed and have them connected to the domain once it's operational. All client systems will be positioned on the purchased desks long the walls of required rooms to allow length for cabling to be short and to allow space in the room for use. The monitors will be connected to the tower via HDMI cabling along with the mouse and keyboard via USB 2.0 cabling connectors. Speakers will be provided with all clients to provide volume during general work, training courses and for potential video or voice calls via Skype. Client systems will only be useable locally via the administrator account for security reasons hence most staff will not have local access although they will be able to use their domain accounts as required. The guest account will be disabled to also ensure security as these accounts can be accessed by anyone. Using RJ45 Cat5e cabling, the clients will all be connected to the closest switch to their location providing their access to the network, each client will also be enabled to use the wireless connection but will be secured with MAC address filtering. All client systems that are a part of the domain will be networked via DCHP to allow an easier and faster network configuration. This is allowed due to the DHCP server having a scope configured that allows a set range of addresses to be assigned to them.

Refer to [Appendix X](#) for a screen print of how they would look once fully connected.

## 9.2.3 Routers, UPS, Switches & Cabling

This subsection will explain the devices and connections that enable the network to function physically. The router configuration will explain how it is configured to be able to connect to the ISP while being able to connect the internal network along with explaining and positioning of switches. The cabling will feature detailed lengths for certain rooms and devices and how it feeds through the building.

### 9.2.3.1 Routers – Installation and Configuration

Routers are required to allow data traffic to travel through a network or several through various more routers until it reaches its destination. The specialist has purchased the Cisco 1760 Router to allow the network to function and connect while providing access to the internet. The router will need to employ the use of two network interface cards to allow the access onto the internet and another to allow the devices on the internal network to connect. This router is mountable within the purchased cabinet and will be secured along with the other devices installed inside.

Crichton Memories require a router that can connect their internal network together while allowing a connection to the public internet. To do this, the specialist used the Cisco Packet Tracer application to create a virtual version of how the real network would function. To configure this correctly the specialist may need to use the interface to enter certain code in to ensure an over complete configuration. To begin the configuration, the specialist needs to navigate to the console and enter “#conf t” which tells the system that the configuration has been begun. The main points that are required during this setup are the hostname which is basically how the router is identified on the network which has no other effect except helping user know what it is and its purpose. If the hostname isn’t changed, then a default name would be selected which isn’t helpful for identification. For Crichton Memories, the hostname could be set to “#hostname memories” which would clearly identify the router is used for the Crichton Memories network.

The next important feature is to assign passwords which will allow configuration in future once completed. There are two passwords to configure for security: the secret password and a regular password. Once configured, users can go into the console interface to view the configuration although it won’t be editable without the regular password. The secret password used in the Packet Tracer example is listed as “#ena secret class cisco” although in a live situation the password would be set by the network administrator and feature more complexity, users can enter this password but still be unable to edit anything without the regular password. To confirm the password, the user must enter in “#line con 0” which means the secret password just assigned is being set into console 0. The regular password in this example is again “#password cisco” although this would be different than the secret password to provide more security to the configuration. Before the addresses can be configured, the user must use the #exit command to leave the configuration.

The specialist now needs to configure the interface cards that allow connections, only two types are required in this installation: serial and fastEthernet. First the serial connection will be configured with an internet protocol address and subnet mask, this is the interface used that will connect the internal network and provide an internet protocol address and mask for the entire company on the public internet. In the specialist’s example, the diagram shows the serial interface as “s0/0” which

symbolises that this is a serial interface then 0/0 means it is the first card and first location on it. To configure the router properly an internet protocol address and subnet mask are required for any network related device to function as without an address other devices won't be able to locate the address device. The subnet is used to mask the internet protocol address on the public internet and shows how many networks are allowed.

The next feature to configure is the clock rate; this is the speed that determines how fast data is received. In packet tracer a generic speed is provided which works for the specialists' example, this can be changed although it isn't necessary unless users want a faster speed. This is only required on serial interfaces and thus won't be needed for the fast Ethernet interface as the aim is to create a synchronous that allows a parallel link. The serial interface has an address of 192.168.0.1 which is in the public range so it can be broadcast onto the internet while the mask in the example is 255.255.255.252 because there is no need for many addresses so the lowest one can be used.

The next interface is the fast Ethernet interface which will allow the internal network to function on the domain network. The configuration of this is similar except a different address will be required which will be for the internal network. The specialist's example shows 172.20.0.1 as the address which is the address of the router on the internal network while the mask is 255.255.255.192 which allows 62 hosts. This amount allows enough devices to connect to the network while allowing enough free addresses for future devices.

The final part to setup is the Routing Information Protocol which is used to share information on the network with other routers allowing a map of paths to be identified for data to travel. In the specialists example, he set the first set the gateway address which is the address used on the internal network before entering the public address which will be used on the internet.

Please refer to [Appendix X](#) for an image of the router chosen.

Please refer to [Appendix X](#) for a router configuration sheet.

### 9.2.3.2 Switches – Installation and Configuration

Switches are required to allow more devices to share the same connection hence many are required for a mainly wired network to operate.

Five switches have been purchased by the specialist and one will be stationed in each department in the building. Within each main department room there will be a small cabinet that hosts the switch, to this switch all the departmental devices will be connected via the RJ45 cable connectors. To avoid messy cabling in the room, the cables will connect from devices to data points in the wall which will feed through the trunking installed and through the walls to reach various devices. Each switch has the ability to support up to 48 devices which ensures future proofing in all areas of the building in the event more devices are added. These departmental switches can only be accessed by network administrators who have the access key to the cabinet. The specialist believes that having multiple switches will reduce impact when maintenance is required which will affect only a small section of the network.

The physical positioning of these switches will be firstly inserted into the cabinet which will be located on a desk in the corner of the room to the nearest data point in the wall. This data point will be linked through the building up to the main router in the main cabinet upstairs. Once the switch is inserted into the cabinet, the specialist can begin connecting the Ethernet cables to the switch which will feed through the trunking and into the RJ45 keystone connectors installed to provide data points. Once the other Ethernet cabling has been connected then the devices should be able to gain network access.

Please refer to [Appendix X](#) for the TP-LINK switch used.

Please refer to [Appendix X](#) to view an MDF of the departmental switches.

#### 9.2.3.3 Uninterrupted Power Supply – Installation Configuration

In the event of power cuts, these devices are used to provide power to the connected to devices to allow them to continue running for a short amount of time. The devices can protect abrupt shutdowns of important devices which would be performing important processes which could become corrupted in the power loss. The specialist purchased two of these to ensure redundancy if one fails, the second can take over.

The UPS devices are connected into the wall for the servers to connect to which will allow them to continue operating in the event of power loss. The UPS devices will be placed within the server cabinet along with the other equipment for security.

Please refer to [Appendix X](#) for an image of the UPS used.

Please refer to [Appendix X](#) for instructions on installing a UPS.

#### 9.2.3.4 Cabling – Installation and Configuration

To provide the connections to all the devices in a wired network, Ethernet cabling is required and the specialist decided to use Cat 5e cabling for the project.

The cabling the user selected is Cat5e for Ethernet connections using RJ45 connectors to connect to all Ethernet compatible devices. The specialist chosen to use Cat5e cabling due to its ability to achieve speeds of cat6 without costing the client as much money. Cat5e cabling is a twisted pair with four wires which are coloured coded and twisted before being inserted into the RJ45 heads. The cabling features low smoke zero halogen casing preventing it giving off nasty fumes like other PVC wires do. The cables are also fire retardant so in the event of a fire they will protect the wiring inside.

The cabling was purchased was bought in reels and cut and wired with RJ45 Ethernet connectors and RJ45 keystone connectors by the trained technicians that were hired by the specialist. Trunking has been purchased to attach the cables to the wall to make the building look tidier and will cause less safety hazards of people tripping over cables. The specialist originally planned to have the cabling go through the ceiling to reach both floors of the building but has since changed his plan. His new plan is to make the cabling follow down the elevator shaft as this provides an easier method of cabling without needing to create many holes in the building. The specialist needs to remember to ensure

he has kept a minimum of 10m spare in cabling to safe guard against having the cables too short in the server room. The server room will have a dense amount of cabling so the specialist has purchased patch panels to allow organisation to the cabling. He has created a naming scheme to identify which port is used where and for which panel for example: ACCRM-S02-PP1-001 shows that the connection is in the accounts room with the second switch and that it's connected to the first patch panel in the first port. The router will connect to the telephone line that goes out of the building.

Please refer to [Appendix X](#) for a cabling scheme in the building.

Please refer to [Appendix X](#) for an image of the Cat5e cabling that was used.

Please refer to [Appendix X](#) for in-depth instructions on creating cables.

### 9.2.5 Printers – Installation and Configuration

Printers are required for all companies to provide hard copies of work to others or to scan documents to add to the network. The Epson printers purchased for the company are all the same type allowing similar configurations and connections to be practically the same minus location, who it will be used by and the purpose it serves. The printers will be deployed in each department along with a spare in the event one fails and needs repair or replacement. The printers will be positioned on desks near the departmental switch in the main rooms for convenient access. The printers will connect into the switch to provide use to the rest of the network. The specialist will receive delivery of the Epson printers at his main place of work for initial installation and configuration to avoid impact of the work on the staff of Crichton Memories.

In the delivery the printer should be provided along with some ink cartridges, a power supply and a driver installation disc. The specialist should put aside the disc and ink for now as the physical preparation of the installation must be performed first before software is required. The printer should be placed on a hard surface before any removing of coverings provided in the packaging as to prevent damage. Once positioned properly then the removal of the safety tape can be done, this tape was there to prevent the printers moveable parts from sustaining damage during delivery. Once completely unpacked the specialist should take the provided power cord and connect the printer to the power to begin configuration. The power should now be turned on as the printer will ask for basic details will be asked such as the language. English UK should be selected along with the time and date. Once details are set and the printer is ready it should be powered down to begin inserting the ink cartridges which requires opening the printer and inserting them in the manner referred to in the instruction manual. Once the ink installed then the printer should have A4 paper properly loaded ready for a test page later.

The computer should now be turned on and the driver installation disc should be inserted. The wizard will ask the user which connection type they would like to setup, in this case it would be a Wired Network Connection which requires the network connection to be active with an Ethernet cable.

Please refer to Appendix X for basic printer setup.

### 9.2.5 Topology – Overview

The topology of this new network follows an extended star topology style allowing all devices to be connected to a central point on the network. This topology will allow all users to have equal access to the resource location without any waiting or having limitations apart from user restrictions. In the case of futureproofing, the specialist decided this topology would be best for Crichton Memories as it provides much more structure than their previous peer-to-peer network

The topology will begin with the internet feeding in through the Crichton Memories firewall before progressing through to the router. From here the connection will connect to the company router which will be connected to the first switch on the network. The first main points of this topology is that the main devices on it are the three servers which provide the storage and services for the clients to use. The router will also feed into each department corresponding switches allowing management and isolation if faults occur in any equipment. The client workstations and printers in each department will be all connected via the departmental switch.

Please refer to [Appendix X](#) for a diagram on the extended star topology used.

Please refer to [Appendix X](#) for information on extended star topologies.

## **9.3 Installation and configuration of shared printing devices**

In this section, the printers chosen by the specialist will be mentioned in more details including their setup configurations and the difference between them in their roles within the company. Firstly, the general information about the printers will be mentioned followed by details of who can manage them and then specific permissions on who can print from them.

### **9.3.1 Shared Printer Installation**

The Epson printers will require to go through a process of sharing on the network to allow staff to be able to use their department's specific printers. The specialist decided on these printers due to their ability to provide scan, print, copy and fax features which saves money for the client and time for the specialist in purchasing separate devices. The printer is small in size which allows more room on desks and easy for configuration and movement if required.

To install shared printers, it needs to be done via a group policy. This is done via the policy group management console by navigating to the relevant computer organisational unit for example sales. Now creating a new group object policy and naming it something related to the printer sharing before linking it to the organisational unit. The next step is to once again navigate the GPMC until at the Deployed Printers folder. Now the specialist should deploy a new printer by locating it by finding the path to the printer although it will need to be shared to be found first. The printers will be set with static addresses to prevent them needing reconfiguration each time they are turned on and off.

### **9.3.2 Shared Printer Permissions**

The printers will be given access granted based on client systems that operate near it so the staff don't end up printing from the wrong printer and needing to move around to another department to get their work. The permissions also will dictate who can print at all and who can manage the print outs. To manage printer permissions, an account with relevant rights must go onto the Domain server where the printer is installed and navigate to the security settings. The user should create a new permission and selecting the relevant users or groups that they want the permission to apply to. Inside the options the users can choose options to either deny or allow access. In an example, the managers will be able to have permissions to manage the printer but the regular staff will only be able to print. Each printer will be setup in this manner for their departments via group policies for each one. The spare printer will be useable by all staff so there will be less restrictions on it. The printers in the other parts of the network and building will only be discoverable by those computers that are allocated to it in the organisational unit.

Please refer to Appendix X for printer allocation within Crichton Memories.

Please refer to Appendix X for details on sharing printers of a network.

Please refer to Appendix X for details on providing permissions.

Please refer to Appendix X for review of features of the chosen printer.

## **9.4 Implementation of users, groups and security**

This section will focus on how the provided services will be implemented into the network after the installations are completed. The specialist has created an organisational unit chart that shows the units that were created for the network. These units will feature groups and users which will have uniquely set permissions which dictate access for certain resources and certain policies that must be followed. The specialist has created several charts and diagrams explaining the file structure of the network which includes application access and resource access. Email access will be mentioned along with the many procedures in place to make the network security strong as possible.

### **9.4.1 User Profiles**

Users are accounts that the staff will use to access applications and store data on the network, these are created either locally or through a domain which is the method for Crichton Memories.

The user profiles for the network will be created manually via the graphical interface due to the low amount of accounts being created although in future more may be created and would be easier to use a batch file to create the accounts automatically. To create user profiles the user must go into the domain controller server and via the active directory manage and create accounts. Each user will be given a logon name and default password that will be asked to be changed after first time login. The password policy decided that no passwords must be smaller than 6 characters and must feature at least one uppercase letter and number, the password policy also states that users are required to change their passwords every month for further security. The roaming profiles will connect to the server via DCHP allowing an easier configuration and user specific applications will be configured to allow use.

#### **9.4.1.1 Roaming Profiles**

In addition to user profiles, the staff must be able to access their profiles on any computer they wish to use in the event the computer they usually use breaks and needs repairs. To do this the specialist will configure roaming profiles for all the staff in the company which will allow them to access their applications and files regardless of the computer they use. Roaming profiles are generally used in businesses due to staff potentially moving around and using multiple devices depending on their work. To configure roaming profiles, the specialist must create a folder share on the member server. This folder share will be where the roaming profiles will be held so it should be placed in a public location. The specialist created a folder in the public C drive using the server management console which allowed him to share a folder on the system without needing to go into the folder properties and named it “Roaming Profiles\$”. This is to help identify the folder to those with the correct rights and the \$ symbol is to hide the folder from the public to avoid them seeing it. Next he took note of the server name and path location as this is required later in the process. With the folder created the specialist should switch back onto the domain server and access the active directory user and computers console to proceed. In here he should go into a user’s properties and edit their profile path by using the details of the folder share earlier. The folder location should be entered like the following: “\\servername\\foldername\\username” once entering this then the specialist should be attempting to go onto the client system using one of these profiles. Logging into one of these clients

should load up the roaming profile although to test if its roaming the specialist should navigate to the system options in the control panel and view the user accounts. In here it will say if the profile is roaming or not. A final way to test if it roams is to create a test document on the desktop then log out and attempt to log into another client on the domain, if the test document shows then the profile will be roaming.

#### 9.4.1.2 Home Folders

Home folders will be used to store files unique to the users roaming account, this is where they will store their work on the network. There will be certain permissions on these home folders in relation to the requirements of the client which will be explained later. To configure home profiles for users the user needs to create folders on the member server in order to share them like done with the roaming profiles. Once a home profile has been created for each user then the specialist should navigate to the active directory and select a user and connect their profile to the folder. This can also be done using a network path like earlier for example: \\serverb\HomeProfiles%\username%. Once assigned the users will have full control to these folders.

#### 9.4.1.3 User Quotas

Quotas are restrictions set in place that prevent users storing more data than they are permitted to. Setting user quotas provides an equal distribution of space on the network preventing one certain user taking up more space than they need and leaving others with less when they require more. A scenario where quotas are required would be a location where everyone can store data and to allow an even amount of space for everyone, a quota would need to be set. To configure user quotas, the specialist will need to install the File Server Resource Manager which can be installed like previously mentioned services in this document. Once installed the specialist can access the application and view existing quotas although none will be created used. The specialist should create a new quota template, which may be used on more folders in order to save creating it again in future. To do this selecting the existing quota temples will show prebuilt ones what contain two types: Hard and Soft. Hard quotas prevent users from storing anything above the limit on the folder while soft quotas continue to allow users to store beyond the limit but they will be monitored. In the company's interests, it would be easier to create hard quotas for shared folders. The specialist should create a new quota template by right clicking on quota templates which will present them with a configuration interface. Here the specialist can define the quota limit, give it a name, description for identification and set the quota type. To notify users of their space limit reached, the threshold settings can automatically email a user. Once the template is complete it will appear in the list mentioned earlier when it can be used to be applied to a folder on the network.

## 9.4.2 Groups

Groups are used to organise users and allow an efficient way of allowing specific settings to be applied to all users within the group without doing so manually for each user. Creating groups is similar to creating user profiles earlier. The process is similar the specialist must go into the active directory users and computers then in the users interface right click and create groups instead of users. Once created then users can be added to allow permissions to be spread more easily. The organisational unit diagram shows assigned groups.

### 9.4.2.1 Organisational Units

Organisational units are folders created on a domain controller via the group policy management console. They are folders that can contain computers that can have specific permissions to do certain tasks that other computers can't for example the sales client workstations won't be able to access the same permissions that the unit the purchasing client workstations can. To create organisational units, the user must go into the active directory and right click on the domain in this case www.memories.co.uk and add a new OU. The interface for creating a new OU will appear and will require a name to continue. The user should select to protect it from accidental deletion to prevent it being lost.

### 9.4.2.2 Permissions

Permissions will be required for certain groups and users to allow specific applications and services to be available. Crichton Memories will require permissions for many features in its network ranging from printer access to application use. The specialist has created a diagram featuring the access of applications. Permissions are flexible can be assigned to single users or groups which allows ease of configuration instead of tediously setting the same permission for every user required.

### 9.4.2.3 Group Policies

Policies are rules that are set out on the domain to prevent users from doing actions that they aren't authorised to access.

Group policies can be useful when wanting to provide further security to certain devices on a network. Crichton Memories have offsite staff so their devices would benefit from extra policy settings. The server management console is also used here to manage and modify certain policies such as the logon policy and password policies. These fall under mitigation and deterrent features as they are designed to discourage users from attempting or doing certain activities and can strengthen security by altering small features. To secure devices that may be taken offsite or in general could benefit from extra security, then disabling unnecessary services within the server management console can provide extra security over the already main applications designed to do so. While disabling services it reduces the amount of open ports that can be seen by the public while browsing the internet. This makes it tougher for people looking for ways to break into the network.

Firstly the user needs to from the server management console create a new “object” which in this case is a unit with the mobile devices staff may take away from the building on the network. After creating this unit and moving the required computers into it, the user can begin to restrict the services for the unit affecting the computers inside. From the group policy management interface new rules can be created, firstly the user will create notifications to users attempting to log on using the computers in this unit via the interactive logon policy. The user should also modify the name of the administrator account via a similar method. Next, the user will use the Windows client system that was placed in the unit to test if this policy change has been implemented. The user should log in with a regular domain account without administrator rights, once logged in they should check the Themes properties which will show that the start-up feature is disabled, this will be because of the policy changes made earlier. Next the user should force updates before logging off the account, now the text that was entered earlier in the login policy should show otherwise the user should restart their computer first. Now once passing the new notification the user should use the administrator logon and change the users to check if the administrator account name was changed, this change happened due to the GPO.

The second feature that will be used by the specialist to secure client workstations will be to limit what default Windows services they can access which increases security. The user can also change the policies for account lockout so after a set amount of attempts they will be denied access. For an example of this in action, the user will use group policy objects to prevent certain applications being used by unauthorised users on other accounts. The user will also prevent administrators running some applications. Firstly, the user will be restricting access to the Control Panel and the Command Prompt for some users. To do this the user must go into the group management policy again and setup another new GPO, in this several options must be edited within the Administrative templates. To restrict the control panel a new path rule must be created which will disallow it to be used. Once this is done the group policy management editor can be closed. Now that the control panel is limited, the next change to be made is the password policy. To do this the user should first go into the group management policy console again to amend the computer configuration policies. The account lockout threshold value should be altered to for example 3 which will allow 3 attempts to log on before being denied. The user can accept the changes and close the console again once done. Now that all the changes are in place they should be tested. Firstly, the user should log onto the Windows system as a certain user and attempt to open the command prompt, this should result in failure due to the new policy rules. The same should be attempted with the control panel which should result in the same message denying access.

#### **9.4.4 Security**

Security features multiple applications and services working together to ensure as little exploits as possible are available to anyone attempting to break into the network. The client wanted the specialist to ensure while the new network was faster and more efficient; he also wanted it to be as secure as possible.

##### **9.4.4.1 Internet Access**

Crichton Memories only wish for certain people to have internet access hence a policy will be implemented to prevent users who aren't allowed. To do this for users who aren't allowed access then 2 groups will need to be created: Authorised Users and Unauthorised Users. Once all the relevant users are added to their groups then the specialist can create a new policy to prevent access. It should be named Internet Policy or something relating to the purpose for identification. Once created it should be enforced and removing the authenticated users from the security filter to prevent the policy working once it's created. Now the specialist should navigate to the Internet Explorer settings to allow the same proxy server to use all addresses. Typing in the loopback address of 127.0.0.1 into the HTTP port 80 and the proxy address will ensure restriction. Now that it's created the Unauthorised Users group should be added to the security filter restricting their access.

##### **9.4.4.2 Firewall**

Windows 10 Pro, like other versions features the Windows Firewall application which can provide by default secure protection from the internet. The firewall is designed to prevent traffic entering through ports and onto the internal network, this can be configured to allow certain ports to be open or closed. Windows Firewall is automatically updated and set to on by default so there isn't many extra requirements needed to improve it although the specialist has purchased Norton so it allows an extra layer for security. Some firewalls don't work well with each other so it's advisable to stick to vendors that allow compatibility with other versions. The firewall can be configured to have specific rules to allow or deny certain connection types. In a basic example, sometimes a basic ping is blocked by firewalls and the only way to allow them in is to create a rule. Rules can be created in the advanced settings then selecting inbound/outbound rules.

##### **9.4.4.3 MAC Address Filtering**

Media access control filtering is a secure way of ensuring no visitors to the Crichton Memories building will be able to find the wireless connection provided by the router. Every client in the building will have MAC address filtering enabled so if new clients are required they will need to gain the permissions to connect.

To ensure the security, the specialist will be making use of WPA2 which provides top tier level security ensuring only those with the authorisation will be allowed through. The user will need to go into the web browser and enter the address to reach the configuration page of the router. Next they can enable MAC address filtering via the settings tab. The user should then add all the MAC addresses for workstations to provide them wireless access should they require it, once enabled a device that isn't authorised to join the network will be unable to see the router.

#### 9.4.4.4 Anti-Virus Configuration

Norton can be configured to allow only certain applications access to gain updates and other general settings that provide required security when connecting to the internet. The firewall can be used to allow specific updates for certain applications. To do this the smart firewall is required which can be accessed in the antivirus control panel. Configuring the application with the exe files of the applications that require exceptions should be added then always allow access.

#### 9.4.4.5 Backup Configuration and Scheduling

Backups are key features to ensuring that vital company data isn't lost during any form of disaster when the primary data in use is lost. The specialist has decided that backups will be stored on a magnetic tape drive which is stored inside the cabinet. Magnetic tape was suggested by the specialist due to its popular advantages in storing large amounts of data that doesn't require to be accessed quickly on an often basis. Magnetic tape was also suggested for its cost efficiency and compact size.

There are different types of backups: Full, incremental and differential. Crichton Memories will be performing full backups on a monthly basis along with an incremental backup running on weekly basis with finally a differential running daily. Having all types of backups running allow all scenarios to be covered as if only incremental and full backups were performed it may cause issues if an old file that had progress on it was overwritten by the incremental backup and the only previous source in existence is from the full backup which can cause a lot of progress to be lost. Differential backups cover this scenario by backing up data daily from the original which could be the weekly incremental or the monthly full backup.

The RAID 5 methodology will also be used for backing up in the event of disc failure. RAID 5 features both disc striping and parity allowing all data to be split into chunks and stored on different discs which allow the full data to be restored if a fault occurs. This is done by an algorithm that calculates what the lost data was using the other chunks to put it back together, this way downtime is minimal and operation can continue and be fixed when time permits.

To setup a RAID 5 on Windows Server 2012 it is important first ensure the BIOS uses the improved version known as the UEFI otherwise it causes problems. The Member server will feature a RAID 5 fault tolerance topology as majority of user documentation will be stored here. The user must navigate to the computer management console to configure RAID 5. The member server will have four drives which need to be configured in the GPT partition format as this is the UEFI format that supports large discs. To create a RAID 5 volume the user needs to right click on one of the volumes present and select the option to create a new volume. The user will go through the configuration wizard which will bring them to available disc volumes which the user should add. Only three are required to configure a raid array and the size can be customised by the user. Once satisfied the user will need to assign drive letters and a mount location before applying the relevant compression options. Finishing the setup will show the drives reformatting then resyncing becoming ready for use once they are displayed as "Healthy".

#### **9.4.4.6 Logon Hours**

Logon Hours were assumed by the specialist to be in place although this was incorrect and has since wished to implement the feature to improve security. Having logon hours improves security as any staff member with ill intent would be unable to log on at an unauthorised time. This also helps with update scheduling as it makes in hours downtime near minimal. Creating logon hours is done by accessing the accounts in the active directory and right clicking them to change logon hours within the properties.

#### **9.4.4.7 Access Control Lists**

## **9.5 Testing the implemented solution**

Once everything has been correctly configured, the specialist must ensure the solution works properly before the final implementation. The specialist will be recording the results via the form of a log book which will detail each test, what the results are compared to what they should be. The testing phase will be split up into five subsections with examples of the testing phase in each.

### **9.1 Users and Groups**

The specialist will perform various tests on the effectiveness of the users and group related solutions. These tests will focus on the ability of the roaming profiles being able to be accessible on many domain linked client workstations and the ability to limit users from storing more than their quota limit.

#### **9.1.1 Roaming Profiles Test**

To perform tests on the implemented solution to the users and groups the specialist has created several PSR visual evidence of how the users and groups actually function. Firstly the specialist will test that the roaming profiles are operational for use in the network before implementation. He has created a log of results for specific stages in the test regarding the actual result compared with the expected result. The main points of the test will feature in the test log provided in the Appendix below. In a summary the specialist first tested if the folder used to host the roaming profiles was working properly which clearly proved so once he attempted to log into one of the profiles on the domain. Next he tested to check if the profiles were roaming properly by going into the system options and checking the user profiles. Here he found the profiles were indeed roaming and to perform a final check he created a test document on the desktop then logged off and attempted to log in via a second client to see if the data was able to roam. Once logged in on the second account the created file successfully roamed with the profile resulting in a successful test.

#### **9.1.2 Authentication**

To test the authentication of the profiles the specialist has setup an error to fix which is performed in his test. The test shows the user attempting to fix the problem which in this case is a subnet error. The test will pass once the account has successfully became able to roam again onto the client system but will fail otherwise.

#### **9.1.3 User Quotas**

To prove that the disc quotes that were configured, the specialist will attempt to save a file beyond the quota limit to see the response given. The test performed would be passed if the user wasn't able to save anything onto the drive due to their quota limit but will fail if they are still able to save documents as the Quota will be setup as a hard quota.

#### **9.1.4 Groups**

With the groups implemented, the specialist will need to test to see if the groups actually allow their permissions compared to another group on the network. This will be tested by folder permissions. The groups created are explained in the organisational unit diagram

## 9.2 File Structure

File structure is testing how the network appears to users and how accessible it is. In a test for file structure, the user would evaluate the folders and rate on how well they are labelled for users ease. The test would fail if the user is unable to reach their intended location after a certain amount of time due to poor naming and locations.

## 9.3 Network Access

Network access relates to how well users can access their resources and if they can even access the network in general. Sometimes simple errors can block access which can cause issues to users.

### 9.3.1 Ping Test

The specialist has performed a basic ping test to show what happens when is unable to connect to a resource.

Please refer to Appendix X for the Ping Test Results

## 9.4 Software

Due to being unable to physically gain access to some software for the testing solution, the specialist will resort to using other evidence to prove the solution works.

### 9.4.1 Microsoft Office

Due to software restrictions, specialist was unable to obtain a working version of Office 365 Business Premium. The test when performed would attempt to access one of the word processing applications, create a document then save it and attempt to access the application on a system that doesn't support the software. If the applications no longer shown on the other client workstation then the test would be successful.

### 9.4.2 Pegasus Opera 3

Due to software restrictions, the specialist was unable to obtain a test copy of Pegasus Opera 3 so for the testing, the specialist will detail the expected results of how Pegasus should work.

First once Pegasus has been installed and deployed to all clients then the specialist should be deploying the software via group policies and organisational units. In the test, the specialist will attempt to access a piece of software that is restricted on another users profile such as attempting to access Beth's payroll applications while on Roberts's profile. The test would proceed and be marked upon if the client was able to access the software package. If the user is denied access to the package then the permissions were set correctly.

The specialist has provided a video of Pegasus Opera 3 in action to prove it works.

### 9.4.3 Dreamweaver CC

Dreamweaver CC requires little testing as since it was installed on Robert's computer the only test required would be to see if he could access the software. This would be likely since the specialist installed the package on the computer locally and not via the domain due to technical issues with the cloud. The specialist has provided a video showing the results of Dreamweaver in action to prove it works.

#### 9.4.4 Norton Anti-Virus

Rue to software restrictions, the specialist was unable to gain access to a copy of Norton before actual purchase resulting in a test being proved via video linked below. The test would include the ability to permit an application through the smart firewall to perform a software update when the application is meant to be denied access. If the firewall pops up blocking the user then the test would be successful. Finally he would need to attempt an update on an application that was permitted before concluding the test.

For extra testing, the specialist can perform anti-virus scans to detect an unwanted application and then remove it.

### 9.5 Security

The security testing will feature the specialist testing the limitations of the security methods implemented. This will include attempting to log onto a client after hours and the ability to ping a computer on the network which has it blocked.

#### 9.5.2 MAC Address Filtering

To test that the MAC address filtering works, the specialist has created a packet tracer scenario that shows the user attempting to access the router on an unauthorised client workstation. This will ensure no random people can access the network. The test will fail if the user is able to find the server while having their address removed from the filter list but will pass if they are unable to find it.

#### 9.5.4 Backups

To show how backups are done, the specialist has performed a test on setting up backups and setting a schedule for them to perform at set times. The test done with backups will be to perform a backup to show the client the backup process.

#### 9.5.5 RAID 5

The specialist has done a test on the installation of RAID 5 fault tolerance to show how it is configured. The test will pass if the RAID 5 volumes are ready for use and are in healthy condition but will fail otherwise.

## **9.6 Managing the project**

To review on the project development, the specialist utilised his e-portfolio to record his progress of the project stage. The specialist kept most of his work recorded offline for ease but updated the e-portfolio with main updates of the progress. If any changes had to be made, they would be recorded and it would require updating the project plan which was used to show and overall timeline of the project progress throughout the year.

The specialist made many changes from the planning stage and these have been shown in the project plan which affect the time scale for the rest of the remaining tasks. The specialist will need to amend the time estimates for other projects to ensure they get back on track with the deadline. In an example, the specialist revisited certain software options selected which required new installation methods which leads to other requirements in the configurations. An Example of these changes would be that the specialist discovered that they had to add training procedures to their schedule as it was missing from the planning stage. The specialist failed to mention many software applications during planning along with what various services are, this was done in the development stage to show the specialist can improve and learn from their feedback.

The specialist managed the project using the previously used Project Manager application and plan document used from the planning. The provided document attached below shows the amendments made since the planning stage including altered timescale and tasks created since.

This also affects the pricing sheet which also altered in the development stage as other requirements had to be purchased or changes

Please refer to Appendix X for the e-portfolio

Please refer to Appendix X for a detailed list of the tasks and dates for the project.

Please refer to Appendix X for a calendar layout for the Project Plan.

Please refer to Appendix X for the pricing sheet.

## **10. Project Evaluation**

The evaluation of the project will feature an evaluation of several elements of the entire project over the past year including all previous stages utilising skills and knowledge I gained over the two years of study.

The main points I will make on the evaluation will first focus on the outline of the assessment which will be reviewing the existing resources that were used during the project plus the user requirements requested by the client. The reviewing of user requirements will feature how I approached the requirement and how I progressed with the project up until the current point.

Once explained how I tackled the project I will describe how well the project was tackled which will feature the points I found were strengths that needed little change and the weaknesses that required more serious changes.

Once explained I will explain my views on if there were any recommendations I would add if there was changes that I could make to the provided scenario which could have improved the quality of my work in the way I tackled the project or my overall initial understanding.

I will then go on to explain any modifications I made to the way I handled tasks during the project based on feedback or extra information I had learned during the course of the year.

Finally, I will review the skills and knowledge I gained during the project and how I applied them.

## **10.1 Outline of the assessment**

The project was based on a scenario which featured the student to plan, implement and review a network upgrade into a business. The project was split into three sections: Planning, Development and Evaluation. To understand the project I followed the development life cycle which explains the process of progress through a report that can lead to going back and making changes at many stages of the cycle which is what I did during this project and it provided a good learning curve for the future. During the beginning of the project I was given various materials that related to what I would need to tackle for each section of the project throughout the year. I will perform a review on all the materials I was provided and evaluate the mentors support on how it supported me during the year.

### **10.1.1 Evaluation of Initial Materials**

This section will provide a basic overview of the initial materials and resources I was provided with at the start of the project and how they assisted me in proceeding with the project. The mentor also provided a brief explanation of these materials as they became relevant as they project progressed.

#### **10.1.1.1 Project Brief**

One of the materials of the project provided by the lecturer was the project brief which featured an overview on the purpose of the project which explained what is expected from me in my submissions. The brief also provides an outline of all the materials I should have access to before I begin the project, what parts I may or may not currently have the knowledge to solve and explains how the project will be structured. I found the brief very useful in gaining an initial idea of how the project will work and what is required of me to complete it. I also learned from the brief that research into topics I have no came across yet will be required, this prepared me to be aware that during the process I may encounter a topic which I need to research on, understand and then add to the report.

#### **10.1.1.2 Project Scenario**

The project scenario was another piece of initial material provided which covered the details of what the project is about including my role in the scenario as a network specialist and the outline of the business I am to perform the network upgrade on. The scenario also provided basic details to why the scenario is taking place along with basic floor plans of the scenario building. Using these details I was about to gain a better understanding of my initial ideas into how I would tackle this project due to the scenario being a computing related business it helped ease my mind on the initial complexity I originally had in mind for the project. Having this information proved useful to coming up with my initial questions when I interviewed the client on what specific requirements were needed to be implemented.

#### 10.1.1.3 Project Checklists

Now that I had the two base materials that covered the entire project I was provided with a checklist on each section of the project. Three different checklists were provided to guide me on what I should be writing about and how to meet the minimum requirements to progress to the next stage. These checklists were split into sub sections which details what is required of me throughout the entire stage and each subsection. The checklists also gave examples of what some of the required appendices would look like which assisted me in how to produce the required evidence. Without these checklists I would be very lost on how to start writing and have any idea on how to structure the report without the mentor's guidance. The mentor also spent time going over each sub section of a stage of the project at an appropriate time through the year which helped clarify my understanding of some points I was unsure of.

#### 10.1.1.4 Report Writing Course

Before we began writing the first stage, the mentor provided us with an extra Open University course which focused on writing reports. This extra piece of learning material was useful into clarifying I had the knowledge to write a formal report as I had not previous written any report or taken part in any project of this size. Without this course I likely would have caused more immature structural mistakes in the report layout which could affect my overall grade.

#### 10.1.1.5 Project Plan

Throughout the first stage the mentor taught me on how to create a project plan which is designed to show how the project should progress based on the time frames set and helps me keep up with my work. Unfortunately I had severe issues in sticking to my project plan although the concept of it is something I would make use of in future once I improve my time management skills.

#### 10.1.3 Project Requirements

There were many requirements I had to abide to during the course of the project once my course of action was chosen. Some of these I was able to accommodate and some I couldn't with my original plans.

Looking into more of the topic specific requirements, during the interviews I learned that there was specific restrictions on software, hardware, security and file and application access. The client requested specific software requirements to meet this staff's needs along with the appropriate security permissions on certain applications. To ensure I met these requirements I chosen not to steer away from the existing software vendors and settled on using more updated versions. I opted for this due to making it easier for staff to adapt to their new software with less training rather than going with a different vendor which would require potential compatibility issues with the current system and require further in-depth training. The client also requested that the network be sped up to accommodate more users due to the current system slowing down as more are added while also requesting a central storage system. The client also requested that the network be as secure as possible while open to expansion in future. This was tackled via various hardware and software I

purchased to protect the network as it works in practice and physically to ensure its continued active stability.

#### 10.1.3.1 User Requirements

The client required basic word processing applications so I chose Microsoft Office 365 Business Premium for this due to it meeting several requirements for the client in one package. The software came with all the required applications which all the staff would require plus the applications are widely used worldwide and have a large reputation. The software also appears professional to use and the package has two extra features which the client also requested which I will mention later. I believe the solution was adequate for the client's needs as it allowed the most applications for the least cost and provides many resources that the business needs within one package.

Video conferencing was a requirement requested by the client to be included in the project for the ability to perform video or voice calls over the internet or network with other business clients or staff members. I decided to go with Skype for Business to meet this requirement due to its worldwide reputation for being one of the top tier video conferencing applications and also due to the fact it was a part of the Office 365 package deal. The software also provided the business features that the client required one being a method of internal communication. I believe the choice was a good investment again as it cut costs being a part of the Office 365 package and provides an array of guarantees from Microsoft which ensure the service is almost always available. The software provides a professional solution to the client's needs featuring various bonuses due to the business edition over the free edition.

Business Suite software was another software requirement from the client to deal with various business tasks the word processing software won't be equipped to deal with efficiently. This software covers many other requirements the client requested which will be covered in this section.

Pegasus Opera 3 was the software I chosen to deal with the clients request in the scenario for many reasons although mainly it was a previous existing software in the existing network. The software is a newer and more modern version of their current edition which will work well with more modern systems which I had also purchased plus offering new and upgraded features that the staff will require. Since the software can be purchased in different ways I decided to purchase the basic software package then add on various packages to meet all the requirements for the client.

The first requirement within Pegasus is the need of payroll software one specific staff member within the Accounts department which is the reason of the first add on package which features Payroll and HR. The software provided the software that the employee required while featuring extra useful content. The software has a professional layout while allowing extremely flexible personalisation to the user. I was able to limit the access of the software to the user via the use of the active directory and groups. I believe this is one of the best solutions to meet the payroll requirement as this vendor is one of the most professional on the market and very few others can compete with it.

The accounts department also is required to feature standard accounting packages which are included in the Financials Business Accounting Software add-on package. Majority of the features

within this package will be provided to the accounts department along with the working base software. Similar to the other solutions I've tackled making use of the Pegasus software infrastructure I believe there is little alternative to a better solution due to the high grade quality of these applications and how they cooperate with each other.

The next requirement regarding Pegasus is the need of a Sales Ledger system within the Sales department. Like the previous requirement, I chosen to purchase an add-on package to the default software providing the features the Sales department will require. This package provided a wide range of features which were suitable for what the department requires plus other applications within the package can be used in other departments within the building. Like many of the other applications, I permitted access to this software to the Sales department for their exclusive use as the client requested. I believe this add-on package meets the requirements of the client and ensures future-proofing due to the updated and modern applications.

The client also requested me to ensure a contact management and sales tracking system is in place to ensure structure within the business to ensure communication and also feature the full ability to track sales. Tracking sales can already be done by the sales ledger although additional packages were purchased known as the Supply Chain add-on and the Business Intelligence add-on packages. These packages working in conjunction with features of the Financials Business Accounting Software add-on will provide a complete system in place for the business. The solution to the issues I believe is one of the best options available as to ensure a complete working system it is unlikely there is another solution that provides in within one package, plus since the add-on packages are designed to cooperate with each other it makes troubleshooting a minimal issue.

Similar to the previous requirement, the Purchasing department are in need of a Purchase Ledger which is needed in order to track purchases made by the company. The same package will support this requirement as previous stated as it contains applications that multiple departments could make use of although this feature was exclusively granted to the Purchasing department. With the additional features explained by the Pegasus website, the ledger features additional tools and applications to help with many other tasks that the staff may require. Like I previously stated on the other packages purchased, I believe this solution to be a top tier choice and there is little other adequate options for the client.

Web design software is a requirement to the project due to the wishes of the client to expand onto the internet to offer a wider range of business to clients. The client also stated that this software be exclusive the sales manager for use. To meet these requests I chosen to purchase Adobe Dreamweaver as currently the network already features this software and an updated version will provide more features and stability on the newer network. I believe this solution is the best option as this software has a reputation and the staff have had experience with this software in the past reducing the need of extensive training.

Emailing was a vital requirement for the business due to the need to communicate with others within the building and beyond with other companies or clients. This feature was the second included with the Office 365 package offering a business solution to emailing. This is appropriate to the business offering the ability to provide a more professional image on their emails while preventing general spam and other unwanted emails. This solution is one of many choices although

due to being included with the Office 365 package I believe it was cost efficient and meets the client's needs.

Beyond the software itself, the client requires his staff to be trained to use the new software to which I chose to provide access to Lynda Courses to provide an online training program which provides more flexibility for the staff to learn and reduces the costs of bringing in people to teach for the various software types. This solution I believe is the most cost efficient and flexible method to the project due to the ability for staff to train out of the building and allows the business to operate with minimal interference due to learning.

The requirements to hardware mainly focused on specific client workstations and printers which were to be restricted by department. The client workstations were identified as a key factor for the upgrade due to the existing age of the computers themselves and their operating systems. I chose to purchase computers from Dell to be installed in each department of the building ensuring compatibility with operating system and applications. This also ensures troubleshooting is kept at a minimal. Having the same systems and operating systems I believe will meet the client's needs while ensuring the business is improved to be more modern and will reduce the need of further upgrade both hardware and software wise for the coming years.

Since the printers were to be restricted by department minus the spare printer, I opted to tackle this by invoking a wide range of permissions and groups. The solution logically proved successful although the live test was unable to be performed. The permissions stated by the client included a tiered system in which managers got more permissions to the printers than standard staff members. Using the groups and permissions allowed managers to access, modify or deny certain print jobs. Unfortunately, the actual test couldn't be performed although I produced a logical projected result which I believe is adequate enough for a balance between security and usability within the company.

#### 10.1.3.2 Network Requirements

During the interviews with the client, it was made known that he required his new network to feature a central storage system and perform at a much faster rate while being stable which provided an array of challenges to tackle.

Firstly, I decided implement three Dell rack servers to the new network which would cover his requirements of quicker data speeds and central storage. Out of the three servers, the domain and member server provided a connected central storage system allowing a place for all users to store their personal work and also share other work. I believe this solution is a serious upgrade from the current network which will perfectly meet the client's needs of having a central place to store data as all users will be provided with their own space and be connected to the domain network enabling them to utilise this infrastructure.

The faster data speeds are handled by the new cabling I chose to have installed and wired throughout the building. These new Cat5e cables offer much faster speeds while being protected against fires and trip hazards due to the new trunking installed on the walls. I believe this provides a good balance between safeties while ensuring the client is gaining the quicker speeds he requires. The speeds provided are of adequate standard and won't need to be changed for many years.

To have the ability to host a website for the business, the client requires a web server which I chose to implement as the third server. Using the same operating system and server type as the other servers it ensures the ability to connect without any compatibility issues and is much better than the current solution to a web server due to having a dedicated server along with the required services provides better stability and efficiency in its task.

Finally, the client requested that his new network be configured with a specific domain name to suit his business. Using the domain server I created the new domain with the requested name of “www.memories.co.uk” and then elevating the server to a domain controller. When clients login the domain name will appear at their workstation when logging in and show they are connected to the company unique domain network. Due there only being one way of doing this via this topology I believe the client will be satisfied with the results.

#### 10.1.3.3 Security Requirements

Security covered a range of challenges to tackle. This included security features such as the ability restrict logon hours to certain users and to prevent unauthorised users connecting their own devices to the network. Restricting logon hours was a simple task done within the active directory on the domain controller. While reading the notes taken from the interviews of who is permitted more hours I was able to restrict those required. Through theory, logon hours would be successful if configured correctly although a proper test wasn’t performed. I believe this solution will ensure access is denied after hours to the set users reducing the risk of any malicious attempt from any staff member or outsider in future.

Backups are required to ensure in the event of a natural disaster or system failure that the network can be restored with a minimal amount of downtime. To cover this I setup a schedule of various types of backups to run at specific dates and times while using magnetic tape to store them. I believe this is a good structure meeting many scenarios of data loss while being cost efficient with the magnetic tapes.

To prevent the previous stated backups needing to be used as quickly I have implemented a RAID 5 redundancy system. The client requested the new network be secure and efficient which this aims to help meet those standards. The RAID 5 system will be in place on the central storage server continuing service if one volume fails. This allows troubleshooting to perform before anything more serious happens which ensures the efficiency of the network.

Physical security is required to ensure all the equipment used to run the network is kept safe from damage. To do this I purchased cabinets equipped to house the equipment while reducing noise and heat. A combination lock on these cabinets along with the keys to the server room will be given to only those authorised to access the equipment. This meets the clients need for a secure system on a physical scale.

#### 10.1.2 Course of Action

The most restrictions on the project is meeting requirements based on the client and users to continue performing their business. Using the existing materials provided and analysing the initial brief, scenario and planning stage checklist I choose to begin the project by brainstorming a wide

array of questions to increase my limited knowledge on what user requirements I need to meet while tackling the upgrade. After three meetings with the client I was properly ready to begin the project having gained much needed information on requirements for the client and user requirements. Once ready I made myself aware of the limited budget to the project and how it could affect the implementations I plan to make. Once the Planning Stage was submitted my submission was reviewed by my mentor and I gained feedback which was poorer than I initially expected although once he took the time to explain his feedback it became more justified. This was the first point of feedback from the mentor that influenced how I tackled certain requirements and aspects within the next stage. Using the feedback I gained, I made changes during the Development Stage such as changing how a requirement was going to be tackled in a completely different way or if minor changes were required. All the feedback I took on board and it has helped me understand and learn a lot more than at the start of the project. To continue my course of action I had to work my way through the project meeting the previous mentioned requirements while sticking to the headings listed in the checklists. The project was carried out over the course of the year with a specific deadline set for each section which each had to be submitted.

#### 10.1.2.1 Planning Stage

The course of action through the planning stage involved an analysis of the brief and scenario to which I interviewed the client for more details on what's required. According to the checklist, I was to mention which topics I would find useful in the project to which I mentioned most as many had relation to some aspect of it. This was useful in showing me how all my studies fit together. Next I had to analyse the problem the scenario has in place and to form my initial solutions to the problems. This helped me improve my independent learning skills by researching in my own time and in class on my individual solutions. Once I had researched and had a basic idea of how I would tackle the issues I began to describe how my solutions would benefit the business while keeping in mind restrictions such as time and cost. This was a good learning curve that in the workplace sometimes there are general restrictions that can affect projects like this. With my basic solutions in place and justified I now had to describe the many functional and non-functional requirements that could limit my progress or change it. This sub section had a direct link to the interviews I performed with the client and to all the requirements he needed within the upgrade. This section tested my ability to be able to see if I am able to plan my intended solution while able to make it work while meeting requirements. I then went onto explain the points in the existing network that were key factors for the upgrade. I approached this section by returning to the problem analysis and justifying my solutions with the major reasons in each of the required fields. The final section was made up of other resources I was going to require and more in-depth information on why I chosen certain software and hardware for the task. After the proper planning I had to reflect on how I managed to approach the project explaining how I managed my time in class and at home to tackle the work. Through the stage I was meant to create a project plan to help with managing my work progress.

This section I found difficult although it featured knowledge of my research into a more in-depth level and also included my knowledge learned on the legal requirements of the project. Overall I feel I performed badly on the Planning Stage due to it being my first time of producing a report of this size and also down to poor time management. I also continued to write the report without being certain on what I was writing about was the information I was meant to include

### 10.1.2.2 Development Stage

The development stage began after the planning was submitted so I had to wait for the mentor to mark my submission before I could go deep into the development stage. The development stage begins by explaining how I implement my solutions to the network along with tracking them. Following the second checklist I began implementing solutions in the order of headings provided. In the first section I was meant explain how I implemented the software solutions and justify any changes I made since gaining feedback. In this section due to feedback I discovered I wrote too much about the features of the software and not enough about the implementation and configuration which lost me a severe amount of marks. The next section focused on the configuration of network nodes which included the physical aspects of the network. In this section I made improvements based on mentor feedback which I believe gained me extra marks. Once done, I moved onto the printer configuration in more detail which I believe expanded on the points I made in the previous section and explained properly how I decided to implement the printers and restrict them although I feel my appendix information on this section was lacking. The final part of implementation was to ensure the users, groups and security features were in place. I first tackled the implementation of users by explaining how they are created, structured and secured with permissions within groups and organisational units. Next I went onto to explain the many security features I had chosen on using based on feedback from the mentor and knowledge I gained through the year in my other courses. Once I had written about all the implementation I had to attempt to come up with a test plan which allowed a logical table of results to be created. This shown me how important it is to test vital aspects of the network before it goes live. This is the second part I received poor marks on but though a resubmission and more guidance from the mentor I was about to learn from this and create an in-depth test plan and justify it. Before submission I had to explain how I managed the project again and mention any changes to my project plan and issues I came across during the stage.

I found this section rather difficult and I gained poor marks on it due to mere lack of understanding of some questions and again poor time management and has taught me the importance reading the question and time management. I admit I put a lot of effort into this stage compared to the planning stage, wasted valuable time and lost marks due to these points.

### 10.1.2.3 Evaluation Stage

This is stage I'm at now reviewing and evaluating what I have produced throughout the year and evaluating my own performance. The feedback of the development stage has influenced a lot of points I will make in this stage. The first section is the outline of the assignment which I just mentioned which composes of the evaluation of the initially provided materials and stating my course of action. I will provide a summary of what I have remaining to mention beyond this section. Writing this section has allowed me to give my opinions on how well I believe I done on the stages I done so far in the aspect of reviewing provided resources and having the ability to evaluate myself on how well I tackled the requirements within the project. The next section I will be writing about will detail my strengths and weaknesses during the project. The strengths will be evaluated on how strong they were and if I utilised any good practices. I will then mention my own strengths I brought to the project. The weaknesses I believe will be a main piece of review for my produced work due to the large amount of feedback and generally minimal marks I gained through the project so far. I will also mention the network and user requirement weaknesses in the scenario network. Next I will

mention further recommendations I would advise to improve the network further and improvements to the way I tackled some issues. Once done I will review the modifications I made throughout the project due to feedback or due to me finding out the solution just wouldn't be suitable for the business. The changes I made affected the project plan and I will explain how I made up the time to ensure I kept on track. Finally, I will review the most important pieces of the knowledge I gained through the two years of study that really helped me manage to perform certain tasks for this project. I will also explain how some of these skills assisted me in carrying out the project.

Due to me currently writing this stage, I have no idea how well my marks will be for it although it is a good opportunity to reflect on my work and mention points that I previous missed out.

## **10.2 The effectiveness of the solution including strengths/weaknesses**

This section will focus on the strengths and weaknesses I shown to produce in my work throughout the project. During my review of these points will aim to address various milestones I either managed to achieve or didn't manage to meet while justifying my choices and decisions. The first milestone I should evaluate on within the strengths would be how strong I believe it was able to meet the client's needs or if I could have done better. The second milestone is if any of these solutions embodied good working practice.

### **10.2.1 Project & Personal Strengths**

The first requirement during the project required the need to do research on various topics to gain a clearer picture of how to proceed and decide on my course of action. I believe this was a personal strength as I gathered a lot of information I required utilising the internet and the extra provided resources by the mentor on the college website. Using the information I was able to improve my solution to a level I was satisfied with. This strength helped me improve my weaknesses especially my interviewing which lacked due to the limited questions I was able to ask. The research helped me come up with more relevant questions which gave me more productive answers from the client.

The second personal strength I discovered I possessed was the ability to write my reports. From previous experience writing professional reports I was able to use this ability to layout and manage this larger scale project report providing structure to how it was presented. While many of submissions were crude and not properly finished I still believe my report structure was one of my strengths as it helped me understand what I had already written and prevented me getting lost within my own document. Having ability to structure my reports saved me wasting time searching for content on my report and making changes to specific sections.

While the project sometimes difficult in various aspects, I believe I had some strengths in the way I implemented the topology as the client requested a network that is open to expansion and the extended star topology I chosen achieves this very well. With the ability to easily add on more devices to the network without reducing network quality I believe this solution was the best possible answer to the client's needs.

The second strength I believe I had was my choice of word processing package as while providing the packages the client required it also covered the video conferencing and the emailing requirements for the business. Consolidating the requirements into as little purchases as possible while maintaining the ability to get the most workability out of the solution helps with sticking to the budget. Having the same vendor also helps with troubleshooting as contacting various different vendors for support can become an annoyance and can cause troubleshooting issues with other vendor's software.

### 10.2.2 Project & Personal Weaknesses

While I had strengths in the project I believe I had many weaknesses as well. The first weakness I believe I had to be my interviewing skills due to me not being properly performed as I required three interviews to acquire the information I required to begin the project. The questions I asked initially and the method of taking now the notes was inadequate but I improved on that during my next interviews. I also taken down information incorrectly which had to be changed during the next interview. I believe i could have improved on this by listening better to the client and having a more structured method of taking notes.

The next weakness I believe the project had was the lack of specific resources to help tackle it properly. This varied from hardware not be available to configure for practice or testing solutions on to specific software that was chosen for use. While software was provided through other courses throughout the year much of the software was outdated and wasn't adequate enough to perform proper tests on. This meant that much of the testing section being left with merely predicted results and not many of the topics were properly tested. This wouldn't be an issue in the workplace as the resources would be available for use.

Time management was one of my main weaknesses throughout the year as due to my ability to not manage my working time and my personal life I usually ended up behind schedule. This affected my project plan as I had to modify timeframes for specific tasks to allow myself to catch up on progress. Doing so sometimes affected larger tasks and some were unable to be completed to the best of my ability due to it. In an example I intended to utilise the extra content used for firewalls but due to my lack of time management I didn't have enough time to implement this material into my solution which meant I had to settle with a lesser but useable solution.

## **10.3 Recommendations**

In this section I will provide recommendations of my own personal opinion on how the project could have been improved further. I will mention alterations I would make to the scenario itself which would have performed it along with other recommendations to the course which would equip students with more knowledge on tackling various elements within the project. In relation to this I will also be explaining the experience I learned throughout the course and provide my own improvements that could have been made to make the learning experience better. Finally, I will be evaluating my own performance on the project and offering recommendations to myself on how I could have done better on the project.

### **10.3.1 Scenario Recommendations**

The first recommendation I would make would be on the scenario itself due to many strict requirements from the client. If I could have made any changes to the client's wishes I would opt for greater freedom in using the internet due to bringing in the service mainly for email and hosting websites seems like the resource isn't being used to its full potential. I would allow all clients internet access but provide a security filter on lists of websites that are inappropriate for the working environment.

Next, instead of the three servers being in-house, I would recommend the business use the cloud to host their servers off site as this would allow for lower costs to the client in installation and troubleshooting as the provider would handle that. The reason I never decided to use this in my solution was due to many new requirements and tasks the cloud brings which would seriously affect my timescale due to need for research into more areas in which I lack the experience.

The final recommendation I would make for the scenario is the size of the building provided. The company in the scenario are considered a medium sized company although their building is rather large and I found myself struggling to make most use of the space without leaving loads of empty rooms. The building size also affected the cost towards cabling and the lengths required which would have been reduced if the building was smaller. While the company expected a 20% growth, I still believe the building is too large for their operation at this point in time.

### **10.3.2 Working Practice Recommendations**

In regards to the course I believe more time should be spent explaining the configuration of routers and firewalls. During the course these areas were lightly touched upon and while the resources were available for use I believed taking the time to learn this extra content wasn't relevant to me gaining the marks id require. Featuring more live action configurations of routers would be useful to students due to the many ways of doing it and the same goes for firewalls due to the many types.

The next point I would expand on to improving the experience of the project would be to teach the students to use more modern operating systems and software. This is due to the project taking place in the present while my studies have been focusing on using older software and operating systems such as Windows Server 2003. To make use of what I learned in class and use it on newer software sometimes doesn't always work due to newer methods and changes made in the newer software

versions. Software could also be expanded by having the ability to provide students with access to more software which may relate to the project. This would improve understanding of the used software and improve the testing results as currently very little of the software could be tested due to lack of access to the solution software.

### 10.3.3 Personal Recommendations

The main recommendation I would make for myself is to implement time management properly and learn to stick to the timeframes I set for myself. This is due to me being unable to manage my time between class time doing topics and requirements for my overall grade and personal life while sticking to the timeframes set on the project. This resulted in most of my project work being handed in mostly finished but in a crude manner which would have been avoided with more time management. While the e-portfolio and the project plan were in place to help with time management I still struggled to keep up with the project at several times needing to make alterations to my work to compensate for the loss of time. I believe this is a reason why my marks were generally poor in the end and will aim to manage my time better in future.

The second recommendation for myself is to put in extra effort to learn bonus material. This comes as while there was tasks I was required to do throughout the course and project, there was optional content as well that would have assisted me. While knowing this material was available to use and having the intention of using it relating back to my previous recommendation I was sometimes unable to use this content due to my lack of time management resulting in giving me no time to learn extra material. I believe if I put in more effort I would have gained further marks and understanding using extra material.

## 10.4 Modifications

During the project, especially during the development stage I made many modifications to how I decided to deal with issues in the project and why I had to change them. I will review how feedback from the mentor affected many of my solutions and influenced me to change them while also reviewing how modifying my project helped me learn. I will also state how modifications also came with new tasks to tackle and how taking the time to make changes affected my project plan.

The main reason for many of my modifications was feedback from the mentor after the Planning stage. During a talk he explained the errors in my solutions and provided guidance to help me understand why my solutions weren't suitable. This helped put in the right direction to implement changes which allowed me to gain the marks I required.

### 10.4.1 Hardware Project Modifications

The first modification I made to the project was the way was going to provide an internet connection for the business. Originally I stuck with the solution I knew most about which was a home internet solution although based on the feedback, this solution wasn't adequate for a business. This required utilise the life development cycle and return to planning to come up with a new solution armed with the knowledge I gained. I finally settled on a business solution which turned out to provide more benefits to the project than my original plan. I learned from this that my choice wasn't a realistic solution and it made me aware of more realistic choices available.

The second modification I made changes to was the router I decided to use for the network. This was one of the few modifications I made without feedback but based on new information I learned during class. I learned that there were better solutions for providing a server to a business as I learned more about the different cards required to provide access to the internet and access to the network. This taught me that modifications could happen though out the project based on the skills I learned during class.

### 10.4.2 Software Project Modifications

I made two alterations with the software in the project the first being the word processing package which I originally opted for a similar package but on further research I found a much better deal covering more requirements at once. Since this modification was small it impacted my timeframe very little and with little extra effort I was back on track. This is due to the fact I set myself five days' worth of new research after I received feedback from the mentor which gave me plenty time to change my solution choice. If the project was a real solution it may have taken more effort to implement the change due to the need to buy new software, change how it's configured, and justify why I decided on it over the previous version.

The second software change I made was email as I originally chose to go with Google Mail to provide a business solution although due to my changes in the Office package, it also provided Outlook as an email within the business essentials so to save time I switched to that. The only task this changed for me was the need to change my email account type from Gmail to a Microsoft format which

impacted little due to this being a theory project. If the project was real it may have had more stressful effects on the timeline.

## **10.5 Knowledge and skills earned of developed**

Throughout the two years I spent studying at college I learned a wide array of various skills and knowledge. In this section I will review the new skills I learned throughout doing the project that I was previously unaware of. I will also detail how I believe I could have performed better at this project if I had more experience in the parts that were new to me. Finally I will explain my views on how the mentor affected how I approached the project and if he was any help in providing assistance in how I tackled it.

If this scenario was a real live situation I believe I would have tackled it in a similar way although now due to experience with this I believe I would be able to improve the way I handled aspects of it based on the skills I've learned through practice and feedback from the mentor. The project has properly helped me consolidate much of what I have learned throughout my time studying my HNC and HND by having multiple aspects of everything thrown into the project as various stages. This helps me understand the requirements in the workplace and ensures I don't miss anything out and ensure I stay ethical and abide by the law.

### **10.5.1 Interviews & Research**

The first new experience I was the need to interview the client to gain further information on the requirements the user needs. The reason for interviewing is due to the fact in the scenario the in depth requirements aren't provided and that in the workplace interviews are required to find out what clients want in their upgrades. This leads to performing investigation and research on my own out of class and without assistance. This concept of learning I have touched on little in the past as most content I had to research was in class or I was given a more specific focus of what I had to research. This requirement is good experience for the workplace as research and investigation would be required on any project to come up with solutions.

### **10.5.2 Pricing**

The next practice I believe I expanded on is the ability to price the project. In the past during classes I had to require to price specific details regarding jobs taken which gave me a baseline on how to tackle this aspect of the project. I feel this has expanded my knowledge on pricing due to my prior experience only being limited to hardware and software but now on a larger scale with pricing other minor things such as the trunking and employing people, it has expanded my knowledge. If I had to price this project in the work place it's also advantageous that I learned during this project to be limited by a budget which would make me think more carefully about the solutions I decided on buy weighing up cost and workability. Having the ability to manage a budget allows more free money for the client at the end of the project and also permits extra improvements to be made in future due to the saved money.

### 10.5.3 Storage Cabinets

Before the project I was unaware that equipment was needed to be contained in a cabinet for security and the need of patch panels for organisation of cabling. The mentor taught me through a brief practical example of how components are stored within a rack cabinet and explained why they are structured within. This helped me understand how a lot in how equipment is positioned within rack cabinets which ensures security rather than having them on desks open for anyone to access. I learned from this that in the workplace that equipment would be likely setup in a similar manner if it was located in-house so this experience was a good example.

### 10.5.4 Cabling and Trunking

During the course, the mentor taught me via a practical example of how the cabling is done and how it is stored within wall trunking. Prior to this example I had little knowledge of how trunking fully worked and how cables were created. I had the opportunity to create my own cables and adding heads to them to make them usable. I believe through a practical example or seeing a practical example that some can understand better like I had and would have likely made greater mistakes due to misunderstanding if this example wasn't performed.

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## 11 Appendices

All appendices regarding further information should be located here although links during the document may be more useful for navigation.

### Installation and configuration of operating system and application software – Appendices

#### Client Operating System - Appendices

All extra information regarding Windows 10 will be listed here:

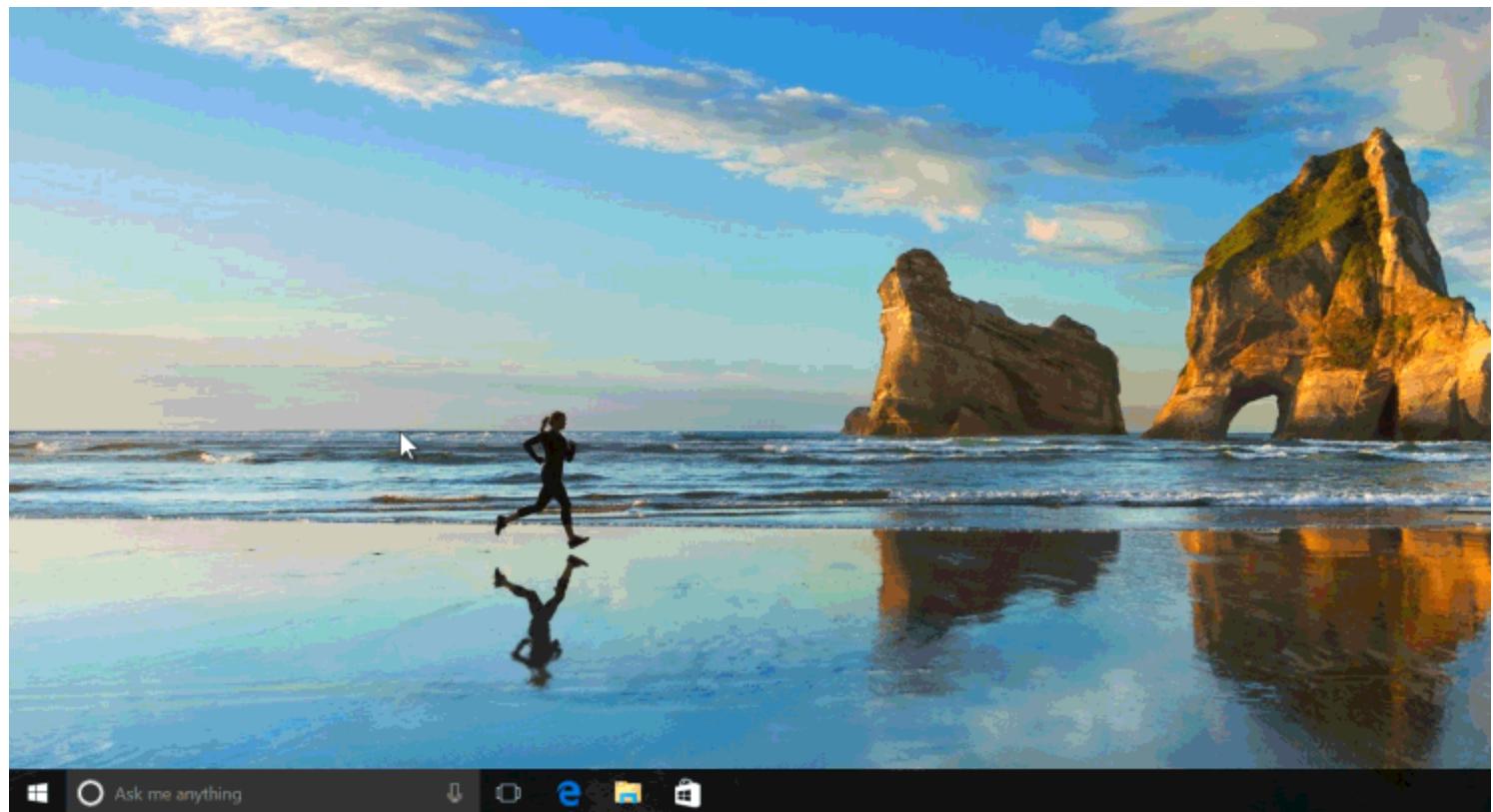
##### *Appendix 70: Windows 10 – System Features*

###### Introducing Windows 10

Windows 10 is full of new features and improvements. Take a look at the highlights!

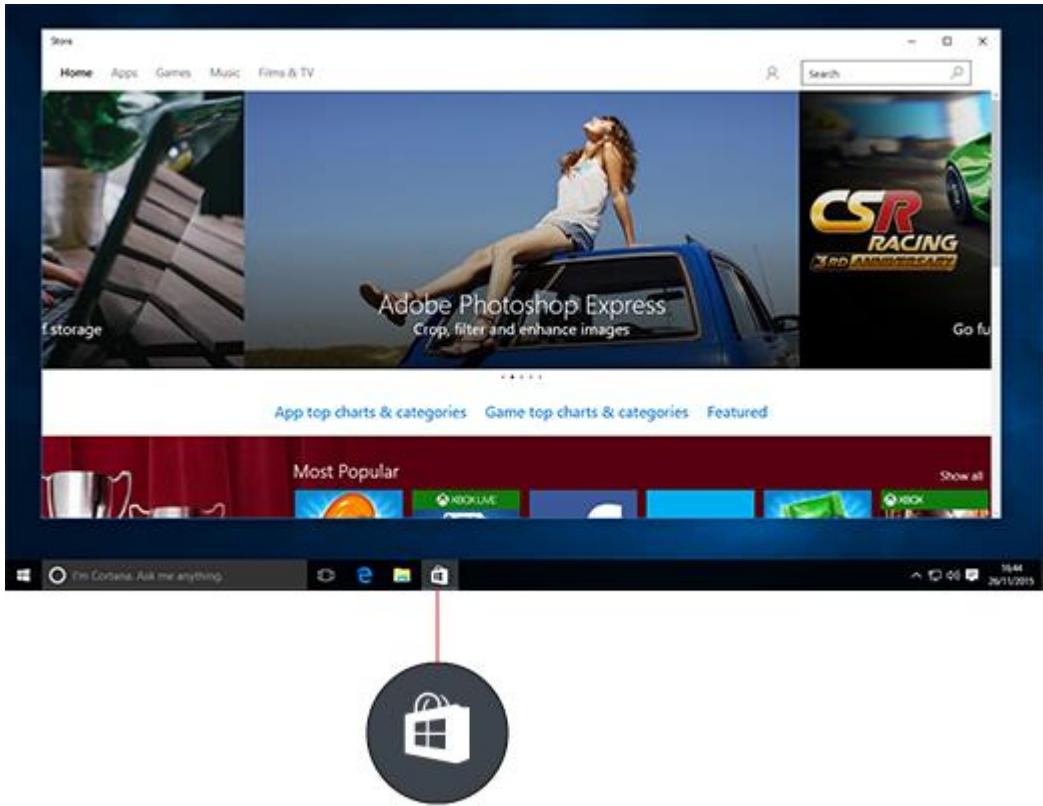
Ready, set, Start menu

The **Start menu** is back – and it's more personal, more organised and more fun than before.



Select the Start button on the taskbar. You'll find your most used apps on the left, the **All apps** list, and shortcuts to other locations on your PC, such as File Explorer and Settings.

Get apps, music and more

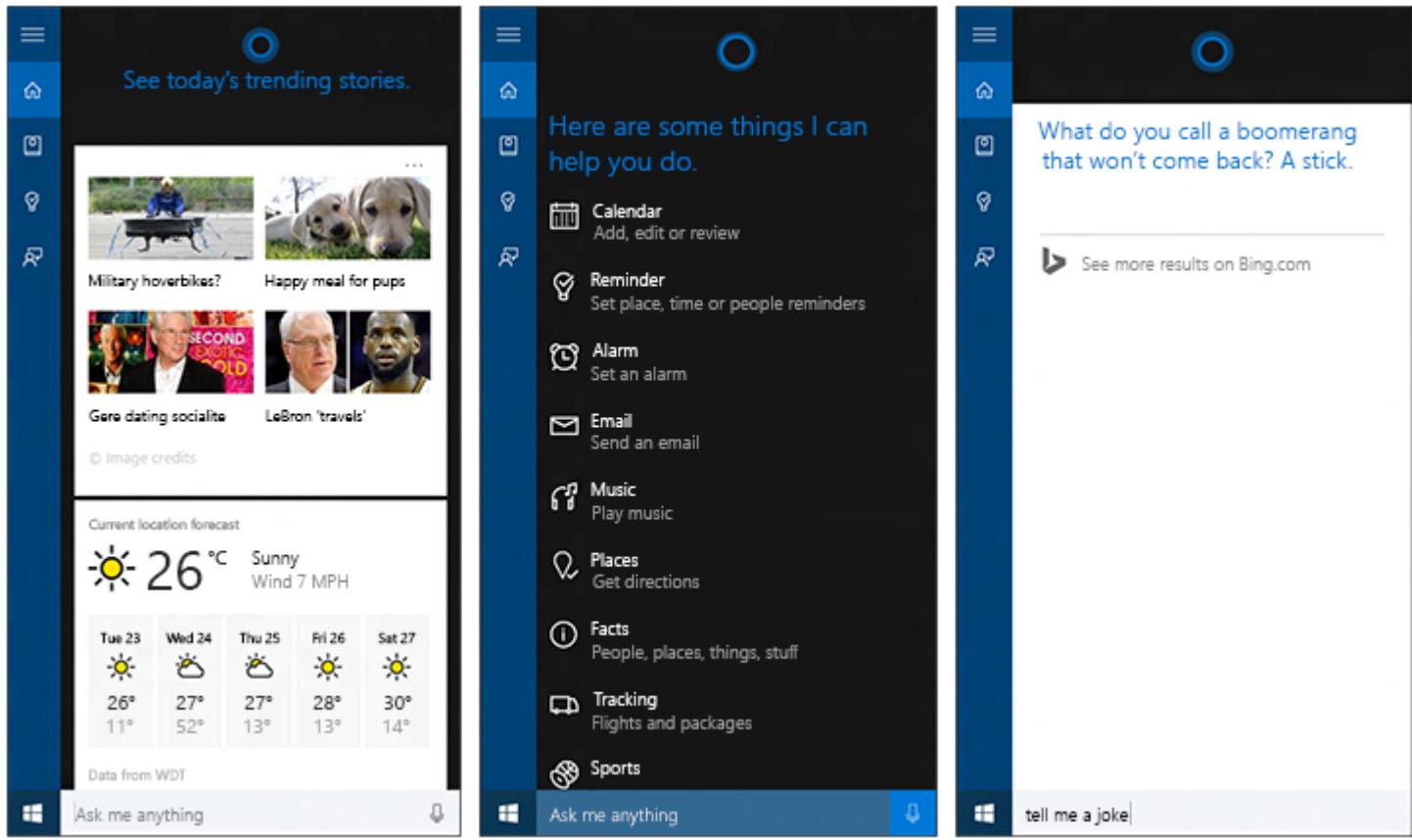


The **Store** is a one-stop shop for music, videos, games and apps.

Try out an app before you buy it, or pick a free one. Your Windows 10 apps will work on all your Windows 10 devices.

Cortana can get it done

**Cortana**, your personal assistant, is right on your desktop. Ask her to set up a meeting or send an email to a friend. She can even find your files for you and tell you jokes. Select the search box and type what you want Cortana to do, or just select the microphone to talk to her instead.

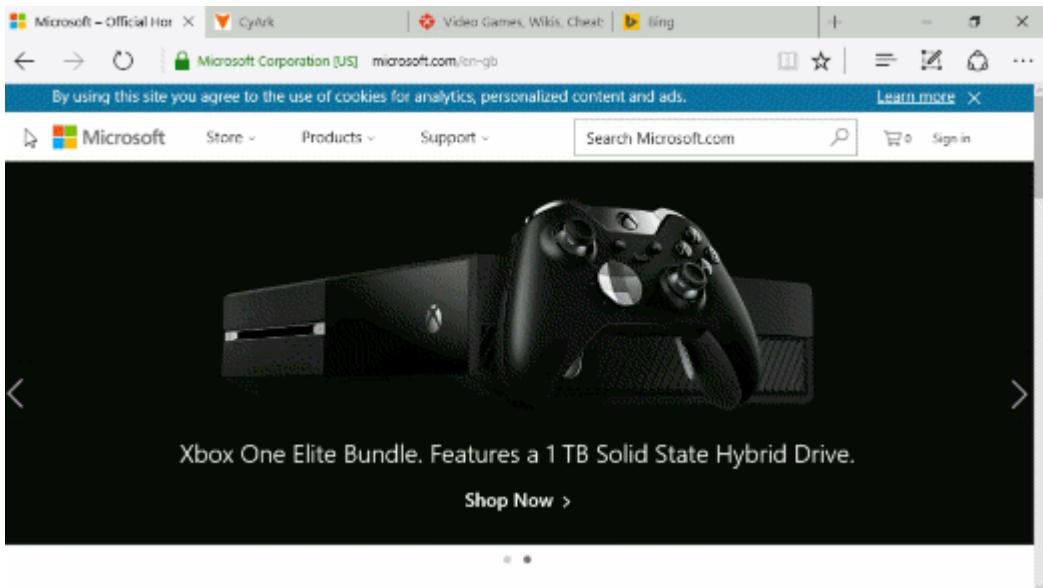


## Note

Cortana is only available in certain countries/regions, and some Cortana features might not be available everywhere. If Cortana isn't available or is turned off, you can still use search.

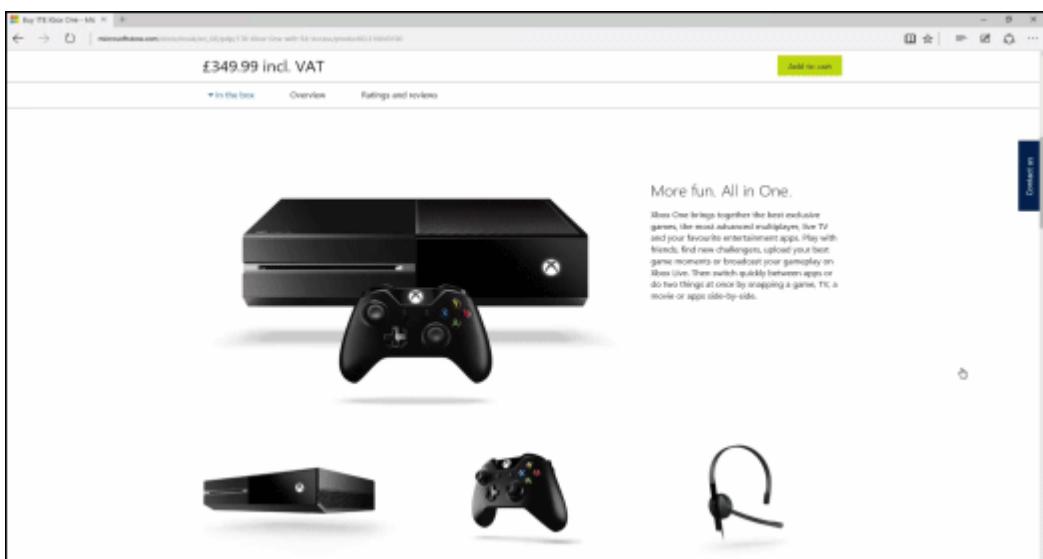
Rule the web with Microsoft Edge

**Microsoft Edge** is the first browser that lets you **take notes**, write, doodle and highlight directly on web pages. Use the reading list  to save your favourite articles for later, then read them in reading view <img alt="reading view icon" data-bbox="595 605 615 625/>. Hover over open tabs to preview them, and bring your favourites and reading list with you when you use Microsoft Edge on another device. Plus, Cortana is built in to Microsoft Edge to help you do things faster and more easily.



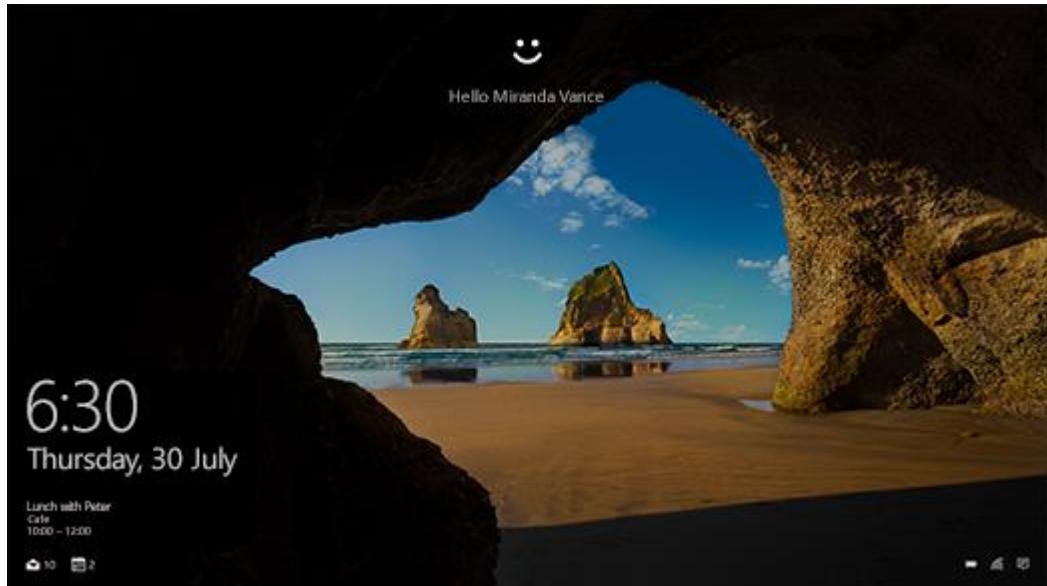
Where you can type, you can write

Microsoft Edge isn't the only app you can write in. Use your **tablet pen**, finger or your mouse to write anywhere you could type before. Or just doodle in OneNote. We won't tell anyone.



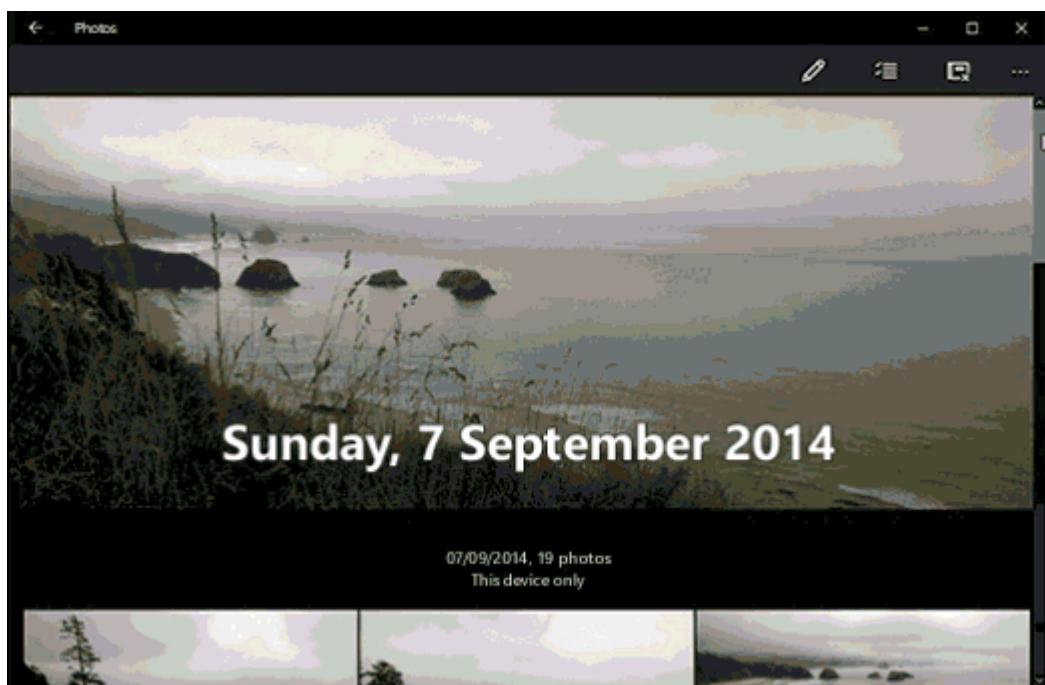
Sign in and greet the day with Windows Hello

If it's available on your device, **Windows Hello** changes how you sign in – it uses your face or fingerprint instead of a password. Go to **Settings** > **Accounts** > **Sign-in options** to set it up.



All your photos in one place

No more endless searching. The Photos app collects all your photos and videos in one place. From your phone, and your PC, and OneDrive. Then it organises your memories into albums for you to enjoy and share.



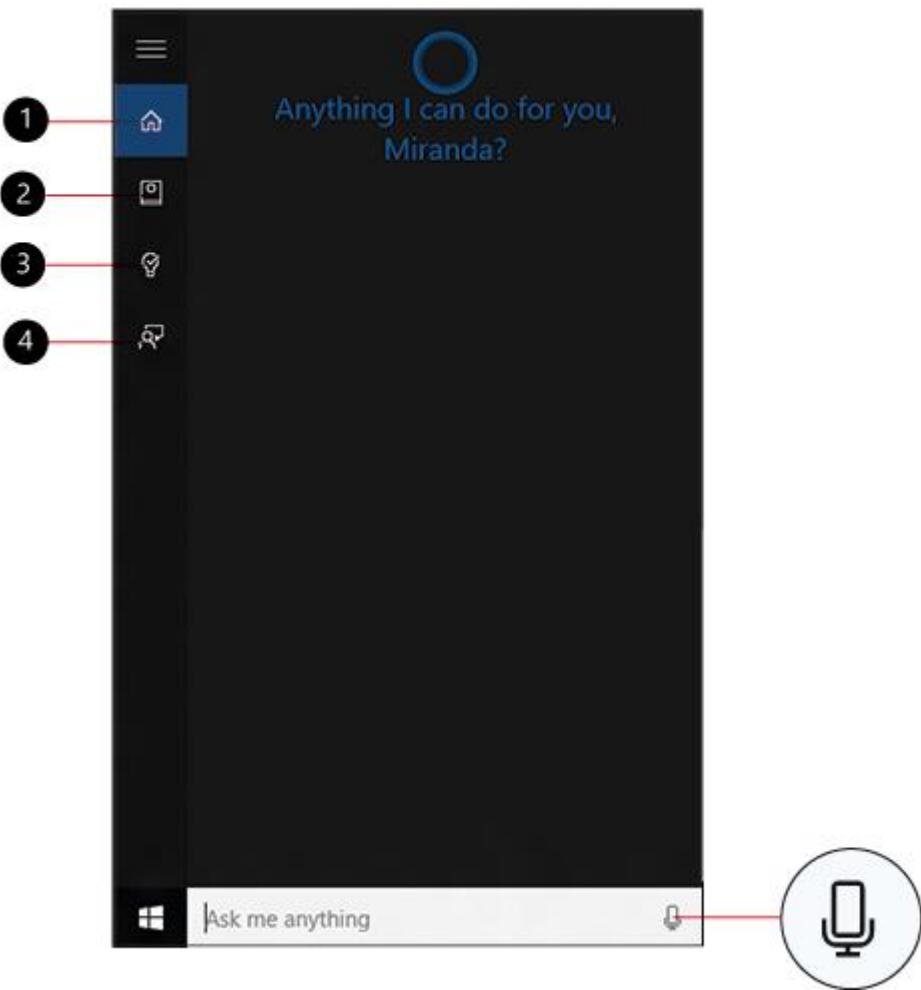
## *Appendix 71: Windows 10 – Cortana*

What is Cortana?

Cortana is your clever new personal assistant.

Cortana will help you find things on your PC, manage your calendar, track packages, find files, chat with you and tell jokes. The more you use Cortana, the more personalised your experience will be.

To get started, type a question in the search box on the taskbar. Or select the microphone icon and talk to Cortana. (Typing works for all types of PCs, but you need a mic to talk.)



1. Home 2. Notebook 3. Reminders 4. Feedback

Here are some things you can say to Cortana:

How old are you?

Tell me a joke.

Show me the latest football scores.

How many calories in a boiled egg?

Put swimming on my calendar for tomorrow.

Change my 3 PM event to 4 PM.

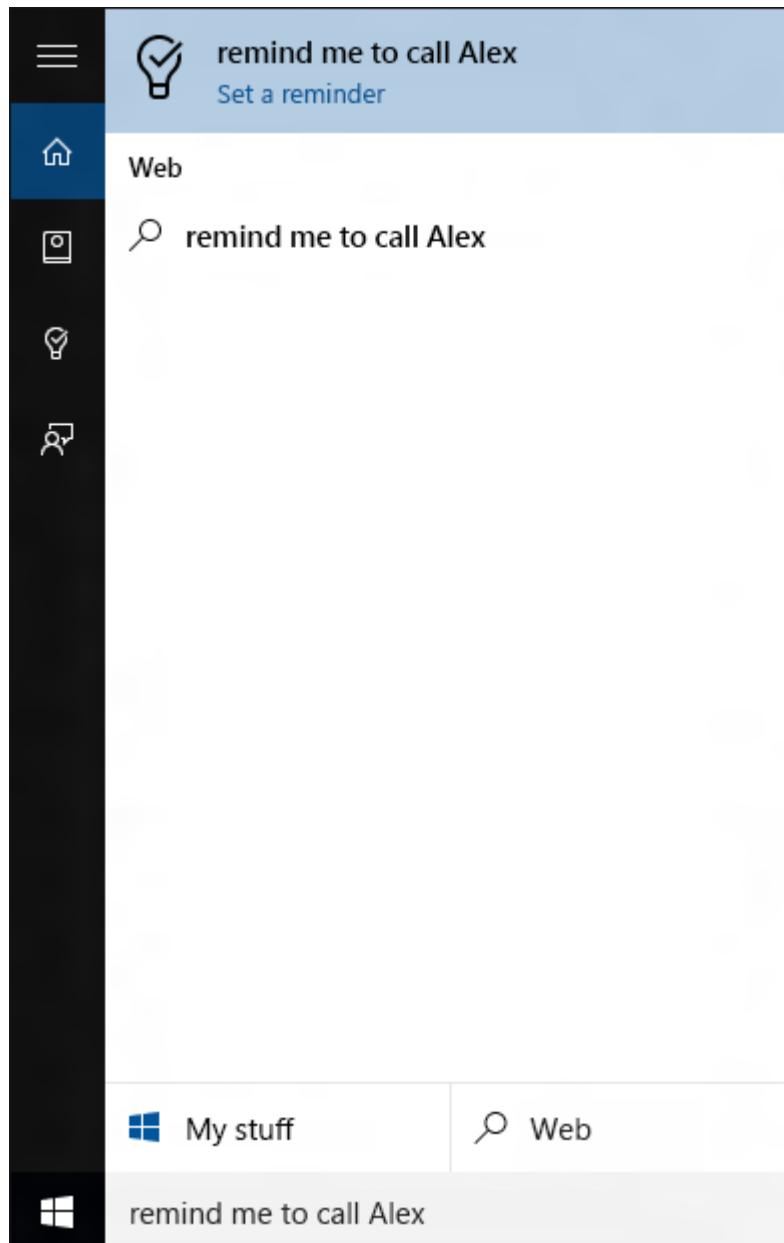
What's happening this weekend?

Try this: set a reminder

One of the things Cortana can do for you is to give you reminders. For example, type or say “Remind me to call Alex at 2 p.m.” Make the meeting recurring if you want to.

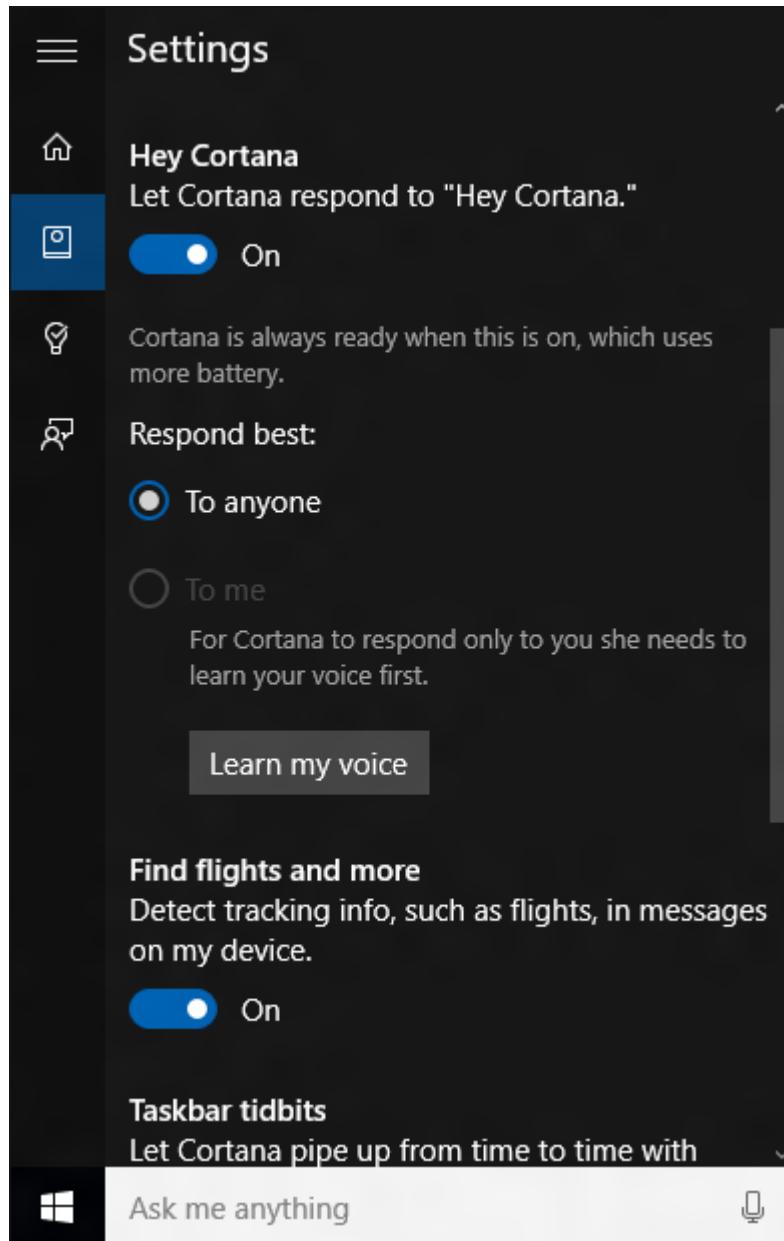
The reminder will appear at 2 p.m., along with any information that you’ve added to it.

Extra bonus – if you have a Windows phone and are signed in with the same Microsoft account, any reminders that you set on your PC will be automatically synced to your phone.



Hey Cortana!

Set Cortana to hear you any time you say “Hey Cortana”. Select the search box on the taskbar to open Cortana home. Then select **Notebook** (Notebook icon) > **Settings** (Settings icon) and turn on **Let Cortana respond when you say “Hey Cortana”**.



## Note

Cortana is only available in certain countries/regions, and some Cortana features might not be available everywhere. If Cortana isn't available or is turned off, you can still use search.

## *Appendix 72: Windows 10 – Clean Installation*

How to get Windows 10 now: Clean install

You can't clean install Windows 10 without going through the upgrade process above. That's because you don't have a product key as you do with Windows 7 or 8, so Windows 10 needs to activate automatically online after upgrading from an eligible copy of Windows 7 or 8.1.

When Windows 10 is activated, Microsoft can identify your PC and associate it with an activated and valid Windows 10 licence. This means you can perform a clean install (even on a different hard drive, so it's a good time to upgrade to an SSD if you have been running Windows on a traditional hard drive) and Windows 10 will activate without issue.

To check if Windows 10 has activated after upgrading, head to Control Panel > System and Security > System and look under Windows activation:

How to clean install Windows 10 - activated

Only if you make "significant changes" to your PC will you have to call the Microsoft activation helpline.

To do a clean install, you'll need to return to Step 2 in the walkthrough above, using the tool you downloaded to create a bootable USB drive or DVD. Once that's done, turn off your computer, install and / or remove any hard drives and SSDs you want to swap around and then boot from your USB or DVD.

If your PC won't boot from it, head into the BIOS settings (typically press Delete, F1 or one of the other F keys just after you turn your computer on) and make sure removable drives, or the DVD drive is set as the first boot device, and not a hard drive. We can't be specific about the menus and settings, since each BIOS is different.

## *Appendix 73: Windows 10 – System Requirements*

### **Windows 10**

#### **Specifications**

Here's an overview of requirements, editions and languages available for Windows 10.

PC

Mobile

#### **Table of Contents**

System requirements

Feature deprecation

Additional requirements to use certain features

Upgrade editions

Windows 10 full localisation languages

#### **System requirements**

If you want to upgrade to Windows 10 on your PC or tablet, here's the minimum hardware that you'll need. Read further below to learn about the additional factors that impact upgradeability. For more information about the free upgrade offer<sup>1</sup>, please visit the Windows 10 Upgrade page for details.

#### **Latest OS:**

Make sure that you are running the latest version of either Windows 7 SP1 or Windows 8.1 Update.

Don't know which version you are running? Need to download the latest version? Click here for Windows 7 SP1 or Windows 8.1 Update.

#### **Processor:**

1 gigahertz (GHz) or faster processor or SoC

#### **RAM:**

1 gigabyte (GB) for 32-bit or 2 GB for 64-bit

#### **Hard disk space:**

16 GB for 32-bit OS 20 GB for 64-bit OS

#### **Graphics card:**

DirectX 9 or later with WDDM 1.0 driver

#### **Display:**

800x600

## **Important notes:**

Windows 10 Home users will automatically receive updates from Windows Update when they are available. Windows 10 Pro and Windows 10 Enterprise users will have the ability to postpone updates. The amount of time by which Windows 10 Pro users can postpone updates is limited.

Small storage devices, like devices with 32 GB hard drives or older devices with full hard drives, may need additional storage to complete the upgrade. You'll see instructions telling you what to do during the upgrade. You may need either to remove unneeded files from your device or insert a USB flash drive to complete the upgrade.

Some devices with either little free space available or smaller hard drives, like 32 GB storage PCs, may have little free space available after upgrading. You may free up disk space and easily delete files, like temporary files or your previous version of Windows, within the Storage system setting. Files for the previous version of Windows give you the option to remove Windows 10 and go back to your previous version of Windows. These files are automatically deleted a month after you upgrade. You can delete them now to free up space.

An internet connection is required to perform the upgrade. Windows 10 is a large file – about 3 GB – and Internet access (ISP) fees might apply.

To check for device compatibility and other important installation information, visit your device manufacturer's website. Manufacturer contact information can be found on the Contact Information page.

The upgradeability of a device includes factors beyond the system specification. This includes driver and firmware support, application compatibility and feature support, regardless of whether or not the device meets the minimum system specification for Windows 10.

Support may vary by device. Find more information on the Windows Lifecycle page.

If your PC or tablet is currently running Windows 7 SP1 or Windows 8.1 Update, you can check to see if it meets the requirements by using 'Check my PC' in the *Get Windows 10* app. To open the *Get Windows 10* app, click on the small Windows icon found at the right end of the taskbar. If you don't see it, visit our Windows 10 Q&A page for more information.

Many applications, files and settings will migrate as part of the upgrade. However, some applications or settings may not migrate.

- For anti-malware applications, Windows will check to see if your anti-malware subscription is current (not expired) and compatible during the upgrade.
  - If the anti-malware application is compatible and current, your application will be preserved during the upgrade to Windows 10.
  - If the anti-malware application is incompatible, Windows will uninstall your application while preserving your settings. After the upgrade is complete, if your anti-malware provider has informed Microsoft that it has made a compatible version available for your active subscription, Windows will notify you to install the latest available version with the settings that were set prior to upgrade.
  - If your anti-malware subscription is not current (expired), Windows will uninstall your application and enable Windows Defender.
  - Some applications that came from your OEM may be removed prior to upgrade.

- For certain third party applications, the "Get Windows 10" app will scan for application compatibility. If there is a known issue that will prevent the upgrade, you will be notified of the list of applications with known issues. You can choose to accept and the applications will be removed from the system prior to upgrade. Please make sure that you copy the list before you accept the removal of the application.

The safety settings for Microsoft Family Safety child users with local accounts (accounts tied to the machine) will not be migrated to Windows 10 during the upgrade. This means that after the upgrade to Windows 10 is complete, parents would need to setup safety settings for the child user along with a Microsoft account if they do not have one. To find out more about the changes, visit the FAQ page.

Some apps and content sold separately. Feature and app availability and experience may vary by device and market.

### **Feature deprecation**

If you have Windows 7 Home Premium, Windows 7 Professional, Windows 7 Ultimate, Windows 8 Pro with Media Centre or Windows 8.1 Pro with Media Centre and you install Windows 10, Windows Media Centre will be removed. For a limited time (the "eligible period"), on systems upgraded to Windows 10 from one of these older versions of Windows (a "qualified system"), a DVD playback app ("Windows DVD Player") will be installed. Note: the Windows DVD Player may not be installed immediately; it will be installed after the first successful Windows Update. The Windows DVD Player will be available for purchase from the Window Store for systems that (i) are qualified systems but the eligible period lapsed; (ii) are non-qualified systems; or (iii) were qualified systems but Windows 10 was subsequently clean installed (in this case, Windows Update cannot detect that it was previously a qualified system).

MDM functionality will not be available in Windows 10 Home edition when Windows 10 is released.

Windows 7 desktop gadgets will be removed as part of installing Windows 10.

Solitaire, Minesweeper and Hearts Games that come pre-installed on Windows 7 will be removed when installing the Windows 10 upgrade. Microsoft has released our version of Solitaire and Minesweeper called the "Microsoft Solitaire Collection" and "Microsoft Minesweeper".

If you have a floppy drive, you will need to download the latest driver from Windows Update or from the manufacturer's website.

If you have Windows Live Essentials installed on your system, the OneDrive application is removed and replaced with the inbox version of OneDrive.

OneDrive does not support placeholder files in Windows 10. Windows 8.1 displayed placeholders for files available in OneDrive but not locally on the device. In Windows 10, users can choose which folders to sync from OneDrive settings.

Snap is limited to 2 apps in Tablet Mode.

### **Additional requirements to use certain features**

Cortana is only currently available on Windows 10 for the United States, United Kingdom, China, France, Italy, Germany, Spain, India, Canada (English), Australia, and Japan.

Speech recognition will vary by device microphone. For a better speech experience, you will need a:

- High fidelity microphone array
- Hardware driver with microphone array geometry exposed

Windows Hello requires specialised illuminated infrared camera for facial recognition or a fingerprint reader which supports the Window Biometric Framework. Windows Hello with an Intel® RealSense™ (F200) camera requires a software update to work on Windows 8.1 devices after upgrading to Windows 10. This update is expected to be available soon.

Continuum is available on all Windows 10 desktop editions by manually turning “tablet mode” on and off in the Action Center. It will be possible to configure tablets and 2-in-1s with GPIO indicators or those that have a laptop and slate indicator to enter “tablet mode” automatically.

At launch, Continuum for phones will be limited to selected premium phones. External monitor must support HDMI input. Continuum-compatible accessories sold separately. App availability and experience vary by device and market. Office 365 subscription required for some features.

Music and video streaming through Groove Music (formerly Xbox Music) or Films & TV apps is not available in all regions. For the most up-to-date list of regions, please go to the [Xbox on Windows website](#).

Xbox app requires an Xbox Live account, which is not available in all regions. For the most up-to-date list of regions, please go to [Xbox Live Countries and Regions website](#)

Two factor authentication requires the use of a PIN, Biometric (fingerprint reader or illuminated infrared camera) or a phone with Wi-Fi or Bluetooth capabilities.

The number of applications that can be snapped will depend upon the minimum resolution for the application.

To use touch, you need a tablet or a monitor that supports multi-touch. Click [here](#) for more info on multi-touch hardware requirements.

Microsoft account required for some features.

Secure boot requires firmware that supports UEFI v2.3.1 Errata B and has the Microsoft Windows Certification Authority in the UEFI signature database.

Some IT administrators may enable Secure Logon (Ctrl + Alt + Del) before bringing you to the login screen. On tablets without a keyboard, a tablet with the Windows button may be required, as the key combination on a tablet is Windows button + Power button.

Some games and programs might require a graphics card compatible with DirectX 10 or higher for optimal performance.

BitLocker To Go requires a USB flash drive (Windows 10 Pro only).

BitLocker requires either Trusted Platform Module (TPM) 1.2, TPM 2.0 or a USB flash drive (Windows 10 Pro and Windows 10 Enterprise only).

Client Hyper-V requires a 64-bit system with second level address translation (SLAT) capabilities and additional 2 GB of RAM (Windows 10 Pro and Windows 10 Enterprise only).

Miracast requires a display adaptor which supports Windows Display Driver Model (WDDM) 1.3, and a Wi-Fi adaptor that supports Wi-Fi Direct.

Wi-Fi Direct Printing requires a Wi-Fi adaptor that supports Wi-Fi Direct and a device that supports Wi-Fi Direct Printing.

To install a 64-bit OS on a 64-bit PC, your processor needs to support CMPXCHG16b, PrefetchW, and LAHF/SAHF.

InstantGo works only with computers designed for Connected Standby.

Device encryption requires a PC with InstantGo and TPM 2.0.

Windows 7 <sup>2</sup>	
From Edition	To Edition
Windows 7 Starter	Windows 10 Home
Windows 7 Home Basic	
Windows 7 Home Premium	
Windows 7 Professional	Windows 10 Pro
Windows 7 Ultimate	
Windows 8 <sup>3</sup>	
From Edition	To Edition
Windows Phone 8.1 <sup>5</sup>	Windows 10 Mobile
Windows 8.1 <sup>4</sup>	Windows 10 Home
Windows 8.1 Pro	Windows 10 Pro
Windows 8.1 Pro for Students	

Skype available only in select countries and regions. Calling to select countries and regions only. Excludes special, premium and non-geographic numbers. For details, visit the Office FAQ page.

## **Upgrade editions**

We'll keep you on like-for-like editions of Windows. For instance, if you are using Windows 7 Home Premium, you'll upgrade to Windows 10 Home.

*"N" and "KN" editions follow the upgrade path of the parent edition (e.g. Windows 7 Professional N upgrades to Windows 10 Pro N).*

*Some editions are excluded: Windows 7 Enterprise, Windows 8/8.1 Enterprise and Windows RT/RT 8.1. Active Software Assurance customers in volume licensing have the benefit of upgrading to Windows 10 Enterprise offerings outside this offer.*

See the Windows 10 Editions page to view and compare the key features that are available in each edition of Windows 10: Windows 10 Home and Windows 10 Pro

## **Windows 10 full localisation languages**

Arabic (Saudi Arabia), Bulgarian (Bulgaria), Chinese (Simplified, China), Chinese (Hong Kong), Chinese (Traditional, Taiwan), Croatian (Croatia), Czech (Czech Republic), Danish (Denmark), Dutch (Netherlands), English (United Kingdom), English (United States), Estonian (Estonia), Finnish (Finland), French (France), French (Canada), German (Germany), Greek (Greece), Hebrew (Israel), Hungarian (Hungary), Italian (Italy), Japanese (Japan), Korean (Korea), Latvian (Latvia), Lithuanian (Lithuania), Norwegian, Bokmål (Norway), Polish (Poland), Portuguese (Brazil), Portuguese (Portugal), Romanian (Romania), Russian (Russia), Serbian (Latin, Serbia), Slovak (Slovakia), Slovenian (Slovenia), Spanish (Spain, International Sort), Spanish (Mexico), Swedish (Sweden), Thai (Thailand), Turkish (Turkey), Ukrainian (Ukraine)

Additional languages available as Language Interface Packs

### **<sup>1</sup>Windows Offer Details**

Yes, free! This upgrade offer is for a full version of Windows 10, not a trial. 3 GB download required; standard data rates apply. To take advantage of this free offer, you must upgrade to Windows 10 within one year of availability. Once you have upgraded, you have Windows 10 for free on that device.

Windows 10 Upgrade Offer is valid for qualified Windows 7 and Windows 8.1 devices, including devices you already own. Some hardware/software requirements apply and feature availability may vary by device and market. The availability of Windows 10 upgrade for Windows Phone 8.1 devices may vary by OEM, mobile operator or carrier. Devices must be connected to the Internet and have Windows Update enabled. Windows 7 SP1 and Windows 8.1 Update required. Some editions are excluded: Windows 7 Enterprise, Windows 8/8.1 Enterprise and Windows RT/RT 8.1. Active Software Assurance customers in volume licensing have the benefit to upgrade to Windows 10 enterprise offerings outside this offer. To check for compatibility and other important installation information, visit your device manufacturer's website and the Windows 10 Specifications page. Windows 10 is automatically updated. Additional requirements will apply over time for updates. See the Windows 10 Upgrade page for details.

<sup>2</sup> 3GB download; Internet access fees may apply. A metered Internet connection is when a service provider charges by the amount of data sent and received by your PC. Windows 10 is a large file: about 3 GB. Before you start the download on a metered Internet connection, make sure that you: (1) Check your current usage, and then work out if this download might result in additional charges; (2) Allow enough time for the download to finish. Most people with a broadband Internet connection complete the download in an hour or two, but download times will vary based on your connection speed and other factors.

<sup>3</sup> Must be running the latest version of Windows 7 (Service Pack 1) to receive the free upgrade to Windows 10 via Windows Update.

<sup>4</sup> Must be running the latest version of Windows 8 (Windows 8.1 Update) to receive the free upgrade to Windows 10 via Windows Update.

<sup>5</sup> The availability of Windows 10 upgrade for Windows Phone 8.1 devices may vary by OEM, mobile operator or carrier.

<sup>6</sup> Also applies to Windows 8.1 country specific editions, Windows 8.1 Single Language, Windows 8.1 with Bing.

<sup>7</sup> If you have Windows 7 Home Premium, Windows 7 Professional, Windows 7 Ultimate, Windows 8 Pro with Media Centre or Windows 8.1 Pro with Media Centre and you install Windows 10, Windows Media Centre will be removed. For a limited time (the “eligible period”), on systems upgraded to Windows 10 from one of these older versions of Windows (a “qualified system”), a DVD playback app (“Windows DVD Player”) will be installed. Note: the Windows DVD Player may not be installed immediately; it will be installed after the first successful Windows Update. The Windows DVD Player will be available for purchase from the Window Store for systems that (i) are qualified systems but the eligible period lapsed; (ii) are non-qualified systems; or (iii) were qualified systems but Windows 10 was subsequently clean installed (in this case, Windows Update cannot detect that it was previously a qualified system).

## Appendix 74: Windows 10 – Purchasing

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Home > Windows 10 Pro



### Windows 10 Pro

★★★★★ (167) [Read reviews](#)

---

With Windows 10 Pro, you've got a great business partner. It has all the features of Windows 10 Home, plus important business functionality for encryption, remote log-in, creating virtual machines, and more. Get fast start-ups, a familiar yet expanded Start menu, and great new ways to get stuff done, plus innovative features like an all-new browser built for online action and Cortana, the more personal digital assistant. Windows 10 is not compatible with Windows Vista.

---

### Get Windows 10

Free upgrade available only to qualified devices currently running Windows 7, 8, or 8.1.\*\*

For system builders or Mac users, buy the full version of Windows 10.

[What is my operating system?](#)

How do you want to get Windows 10? [Free upgrade for Windows 7, 8, or 8.1](#) [Buy Windows 10 \(Download\)](#)

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## Server Operating System - Appendices

### *Appendix 75: Windows Server 2012 R2 – Clean Installation*

#### Step 1: Choosing the right hardware

Microsoft has released six versions of its Windows Server software to date and the 2012 edition is the latest and greatest from Redmond. This step-by-step guide will detail the stages needed to install and run the server operating system.

The first thing you need to do is choose the right hardware. The minimum required processor is a 1.4GHz 64-bit x86 processor with 512MB of RAM and 32GB of disk space.

The greater the specification the faster the OS will run. It's also best to install it on hardware you know will be fit for purpose for the next 24 months at the very least.



## Step 2: Pick the right version of Windows Server

Windows Server 2012 comes in two flavours, Standard and Data centre. The difference between the two is in hardware support and guest virtual machines.

For the purposes of this tutorial we will install the Standard edition. Also, this will be a new install so we won't concern ourselves with backing up applications and data.



### Step 3: Configuring install options

It's possible to install Windows Server using a USB stick or traditional optical media. One of the first things to configure will be the language, currency, time and keyboard options,

A second dialogue box is displayed which shows an "Install Now" button. This needs to be clicked on to progress the install.

From here, you need to choose what type of installation to make. While Server Core has a very small footprint and good for usage where a GUI is not necessary, we shall install a full GUI with the server OS. Next click on the check box to accept the licence terms. Click next. As this will be a fresh install, we will choose "Custom: Install Windows only (advanced)" as our option.

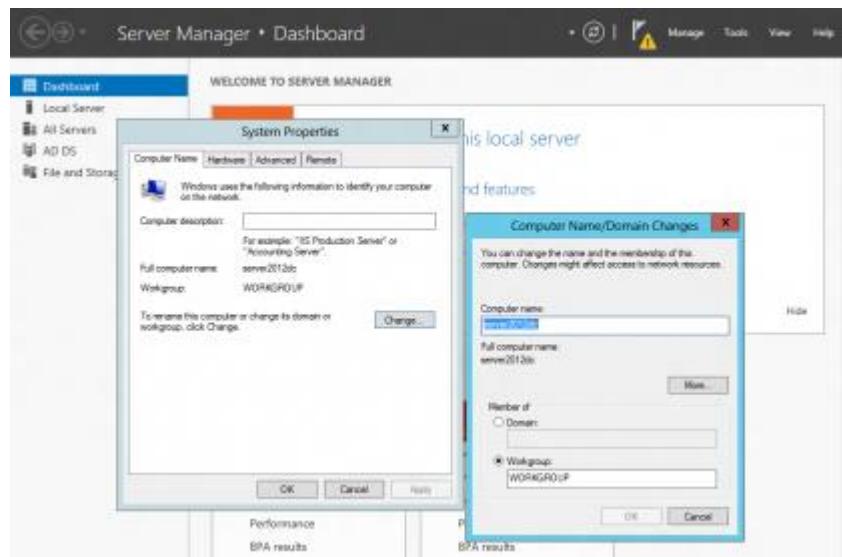


#### Step 4: Installing the OS.

The installation process will now ask where Windows Server is going to be installed. We shall install the OS on the primary partition. It's important to note here that the Drive Options link will allow you to set up and configure any other drives attached to the server.

The disc will now install Windows Server to your hardware. How long this process lasts depends on the specifications of the server. Once finished, you will need to enter an administrator's passed for the newly installed OS. Type this in and click on Next.

Note that Windows Server 2012 now uses the new ReFS file system for all created partitions. ReFS is a new and improved version of the NTFS file system.



## Step 5: Server management and configuration

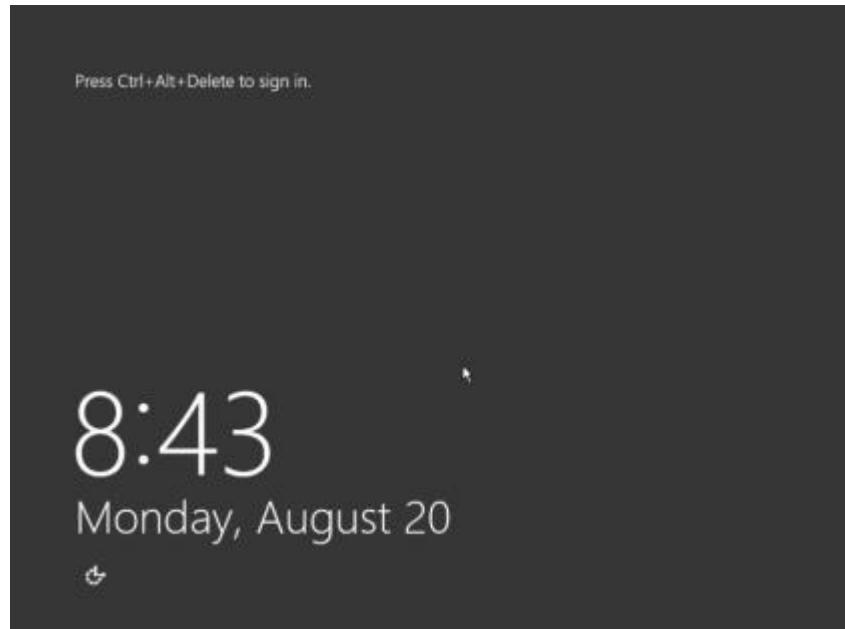
As the admin password has been changed, press Ctrl-Alt-Delete to bring up the login screen. Type in the password you have just created and press enter.

Server 2012 has borrowed a lot of ideas for its GUI from Windows 8. This means that a lot of tasks can be carried out from the Start screen. This can be brought up by pressing the Windows key on the keyboard.

Click on the tile marked “Server Manager”. This brings up the desktop and the Server Manager window. Here you can click on “Configure this local server”. From here you can configure various parts of the OS that you need for your network.

The server will have a default server name and this can be changed to match other servers within your infrastructure. Renaming the server is the primary option within this window.

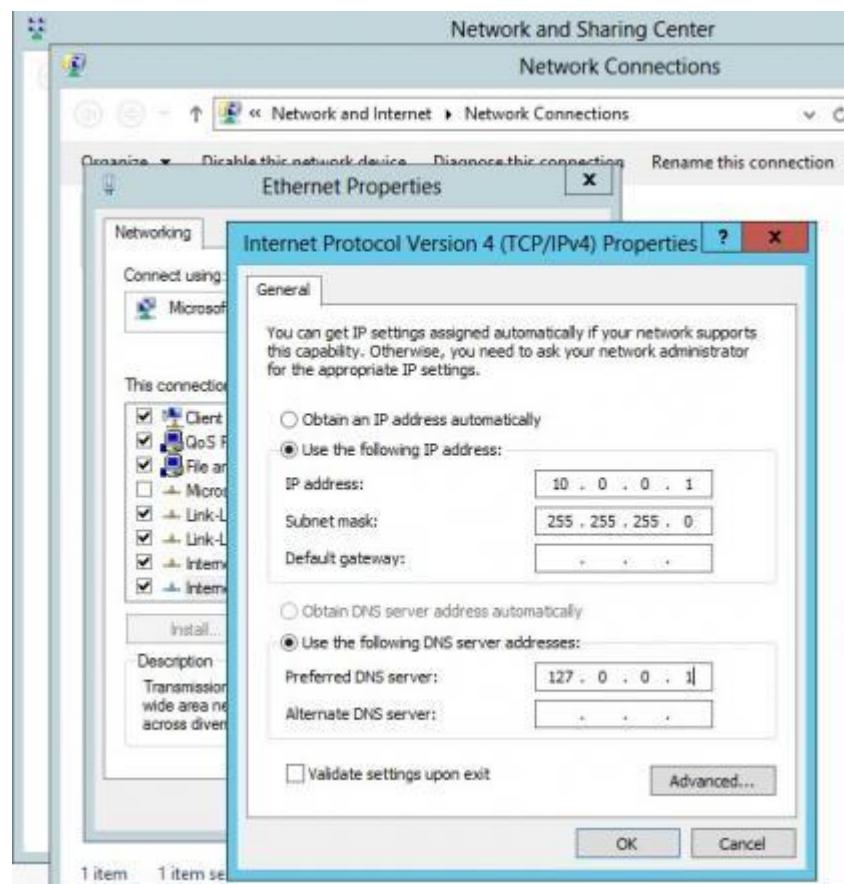
Clicking on the existing name in Server Manager changes the server name. This will bring up the System properties box. Click on “Change”, type in the name you want that matches with your organisations’ naming convention and click on “OK”. After this you will have to restart the server.



## Step 6: Server IP address configuration

With servers, it's always best to give them a static IP address when connecting to the network. This means that you have to set the appropriate server IP address as well as default gateway and domain name system. To do this, click on "Ethernet" and the Network Connection windows will open.

Choose the adaptor you wish to change the IP address on by double clicking on it. This will bring up the information page. Double-click on "Internet Protocol version 4". This will bring up another box where you can type in the correct details for your server's address.

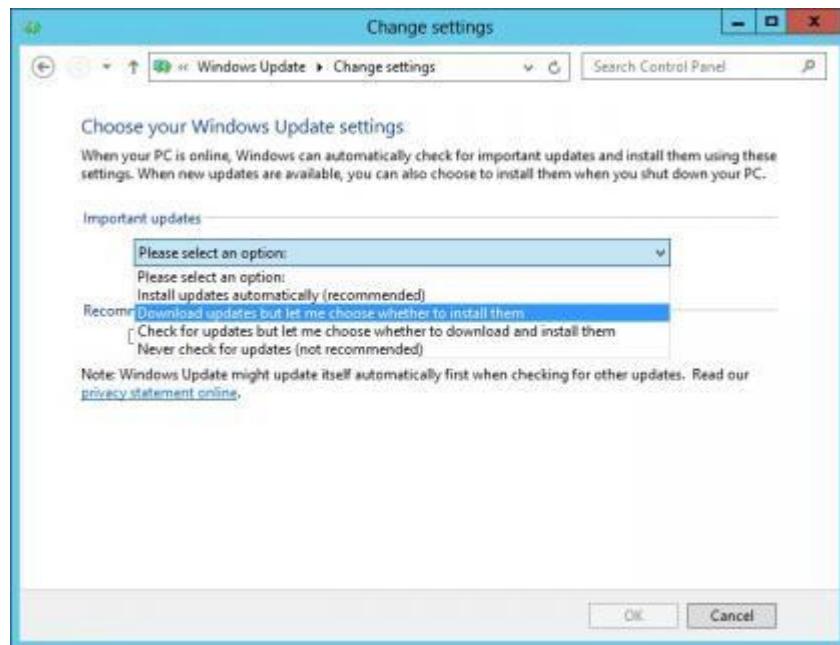


## Step 7: Server updates

As with the desktop version, Windows Server 2012 is given a plethora of regular updates. Larger organisations tend to check updates on a test server before rolling them out to a production environment. But others can set the server to roll out updates automatically.

To do this, go to the Server Manager, click on the “Not Configured” link next to Windows Update. This will show the Windows Update box. Click on "Turn On Automatic Updates" button. This will make the server download and update the operating system automatically.

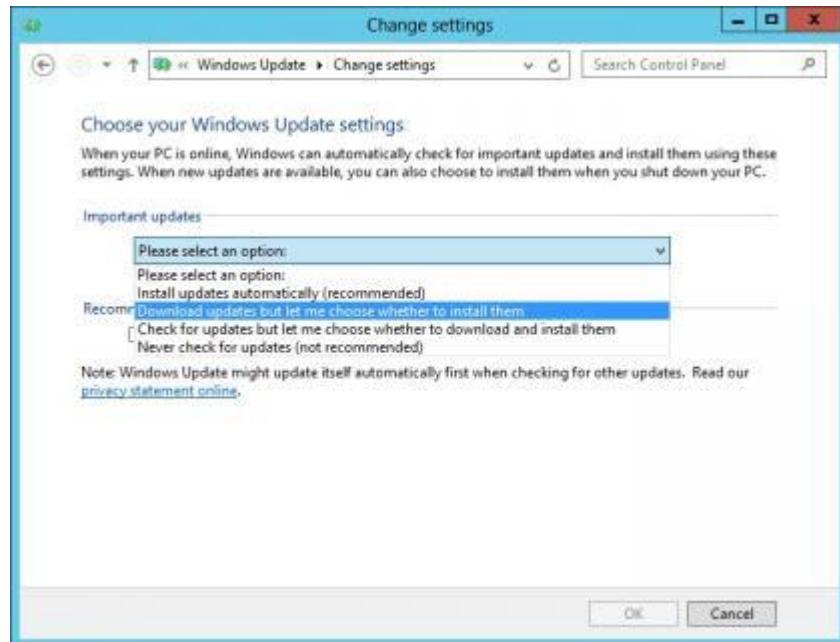
There is another option to "Download updates but let me choose whether to install them", which may be more appropriate to install updates during planned server maintenance.



## Step 8: Setting up Remote desktop

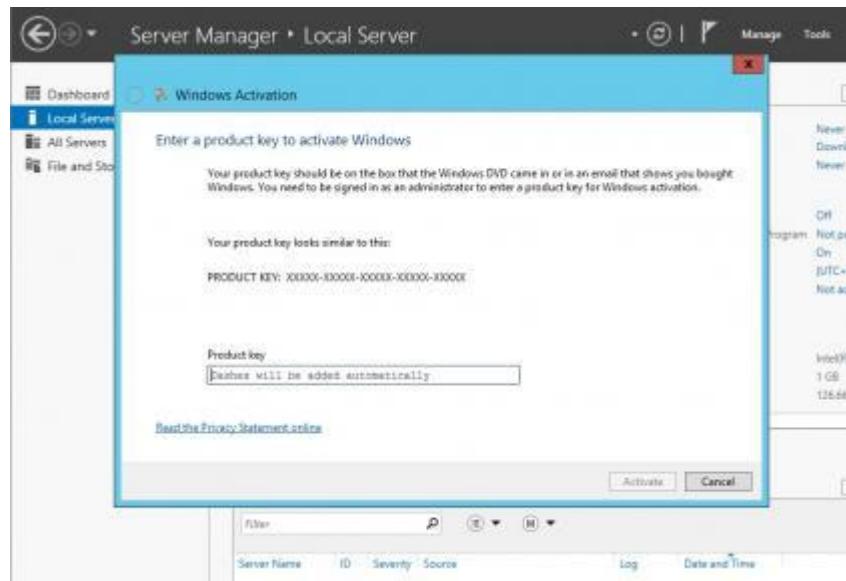
Setting up the Remote Desktop means that you can access the server as if you were in front of it.

To enable this, open the Charm Bar by moving the mouse down to the bottom of the screen. Click on the settings button (the cog icon). Click on “Server Info”.



## Step 9: Activating the OS

The System dialogue box should appear. Click on “Advanced System Settings” when the “Systems Properties” box appears then click on the “Remote” tab. Select “Allow Remote Connections to this Computer”. If needed, check “Allow connection only from computers running Remote Desktop with Network Level Authentication (recommended).

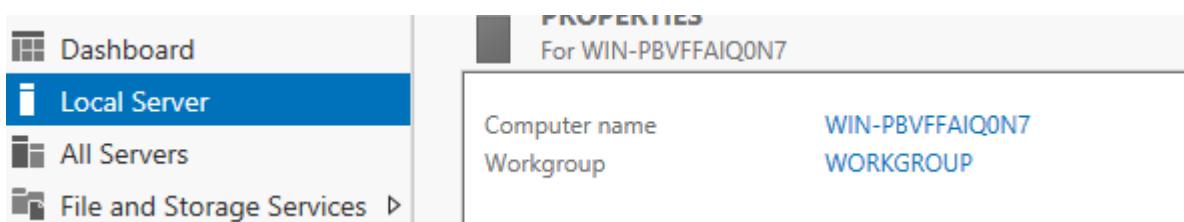


## *Appendix 76: Windows Server 2012 R2 – System Requirements*

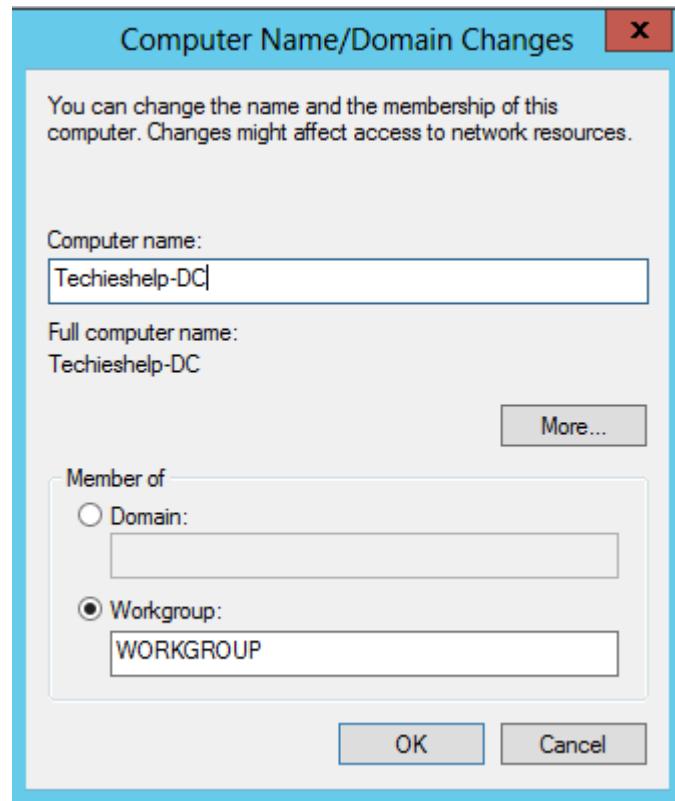
Component	Minimum Requirement	Microsoft Recommended
Processor	1.4 GHz	2 GHz or faster
Memory	512 MB RAM	2 GB RAM or greater
Available Disk Space	32 GB	40 GB or greater
Optical Drive	DVD-ROM drive	DVD-ROM drive
Display	Super VGA (800x600) monitor	XGA (1024x768) monitor

## *Appendix 77: Windows Server 2012 R2 - Domain Setup*

We are now ready to create our new 2012 domain, first we must give our new 2012 server a name. To do so in server manager select “Local Server” then click on the temporary computer name.



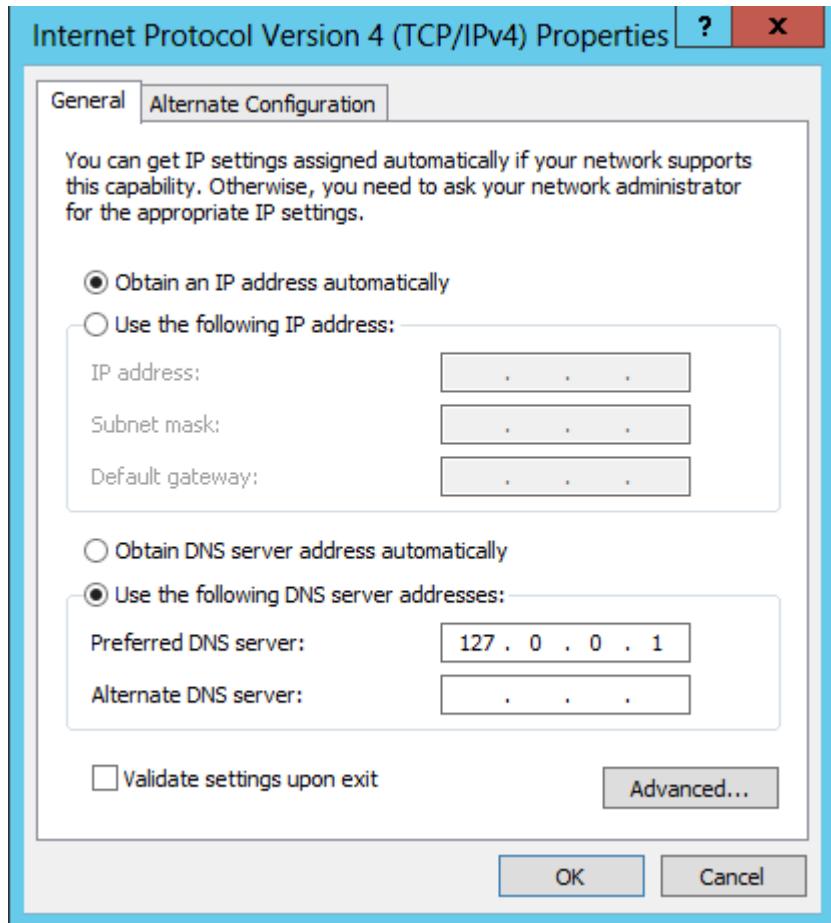
Select change, then give the server a valid name. Once done click OK and reboot.



We now need to give the server an IP address in the range we will use. To do so right click the PC icon in the bottom right hand corner and open network and sharing centre.



Then select Change Adapter Settings, right click your servers' network card and select properties. Select IPV4 ( or 6! ) and enter your IP details and the ok and apply. Reboot the system.



Once it has rebooted and you have logged in, make sure you are back in server manager, we are now ready to add the active directory domain services role. Select option 2, “Add roles and features”. Click next at the standard 2012 prerequisite screen. We are setting up a single role based server so select that option.

Select the installation type. You can install roles and features on a running physical computer or virtual machine, or on an offline virtual hard disk (VHD).

**Role-based or feature-based installation**

Configure a single server by adding roles, role services, and features.

**Remote Desktop Services installation**

Install required role services for Virtual Desktop Infrastructure (VDI) to create a virtual machine-based or session-based desktop deployment.

In server 2012 servers can be grouped so that you can install roles on multiple servers at a time, in this example we are using just one server as it is a new Domain so select your server and click next.

Select a server or a virtual hard disk on which to install roles and features.

- Select a server from the server pool
- Select a virtual hard disk

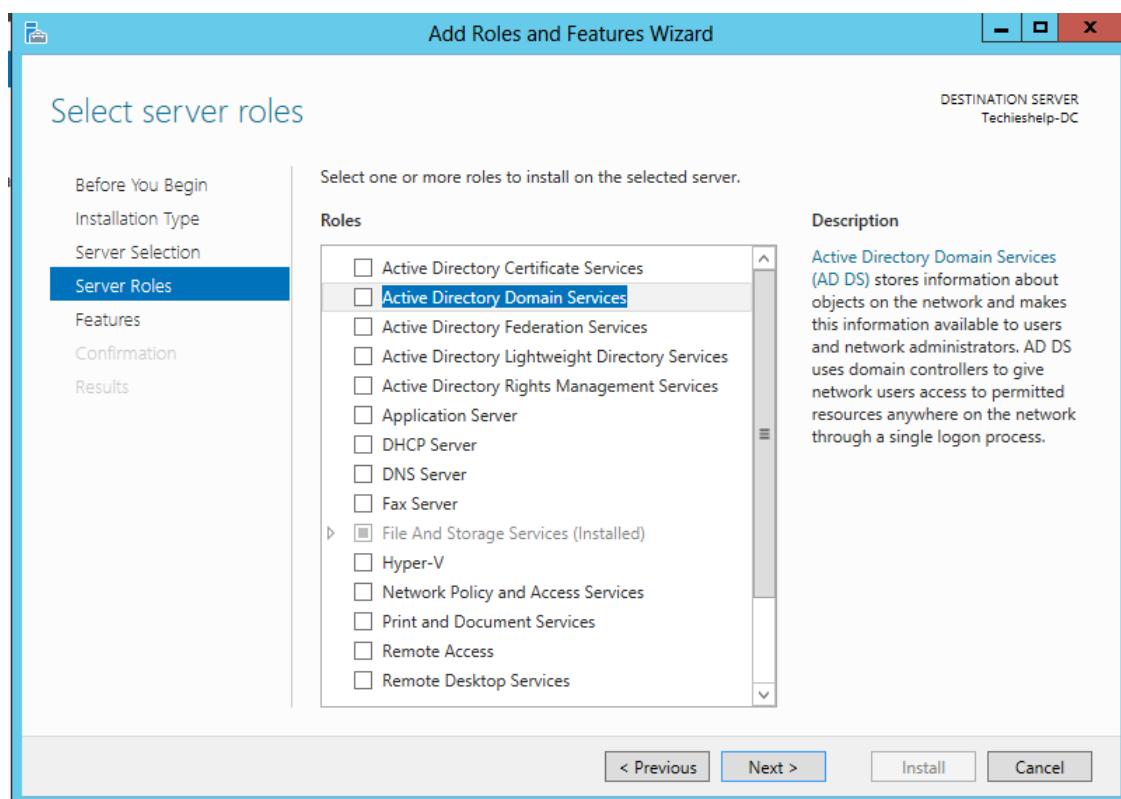
#### Server Pool

Filter:		
Name	IP Address	Operating System
Techieshelp-DC	192.168.127.128	Microsoft Windows Server 2012 Standard

1 Computer(s) found

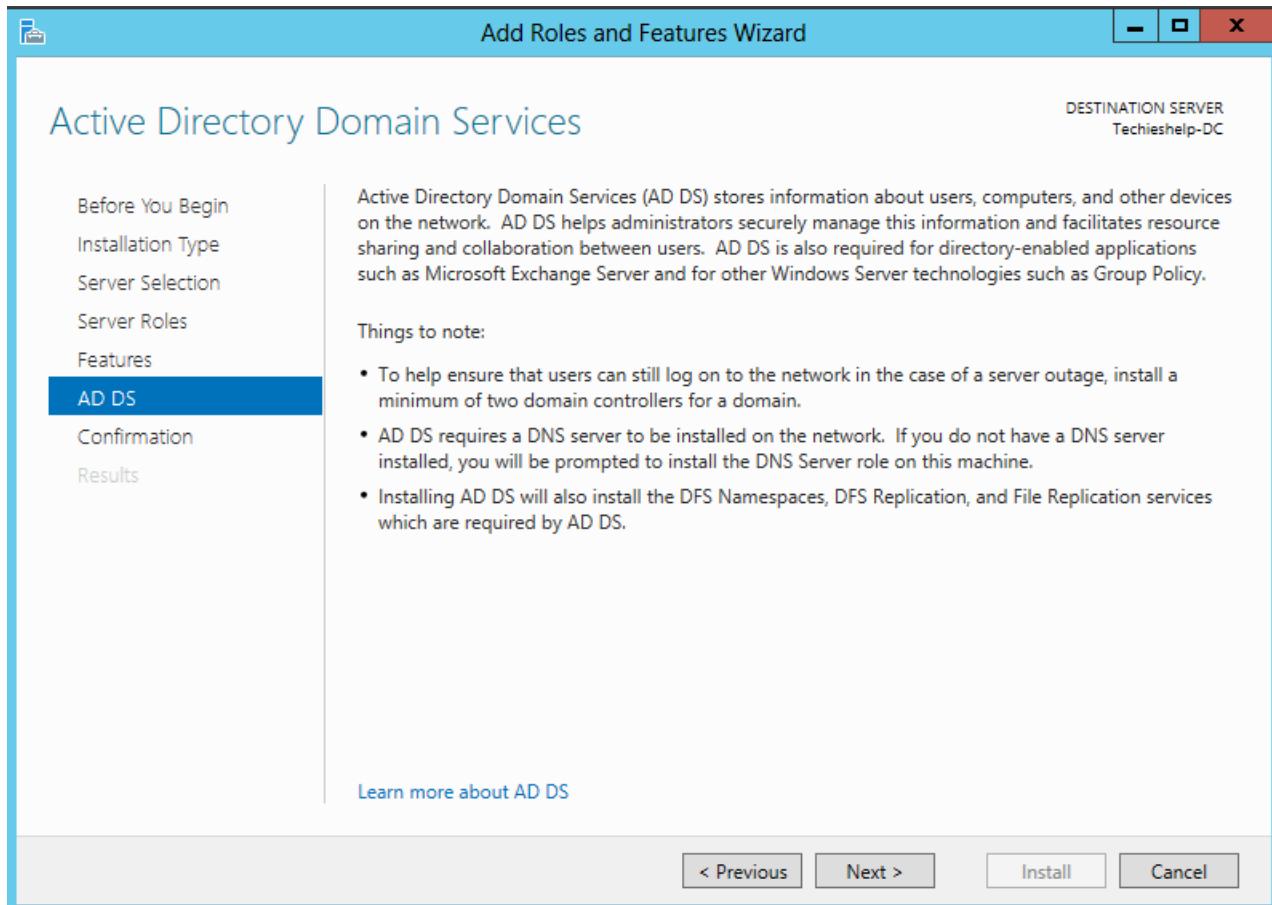
This page shows servers that are running Windows Server 2012, and that have been added by using the Add Servers command in Server Manager. Offline servers and newly-added servers from which data collection is still incomplete are not shown.

You will be presented with all the roles that you can install on server 2012. As we are creating a new server 2012 domain we need to install the role named **Active Directory Domain Services**, select it.

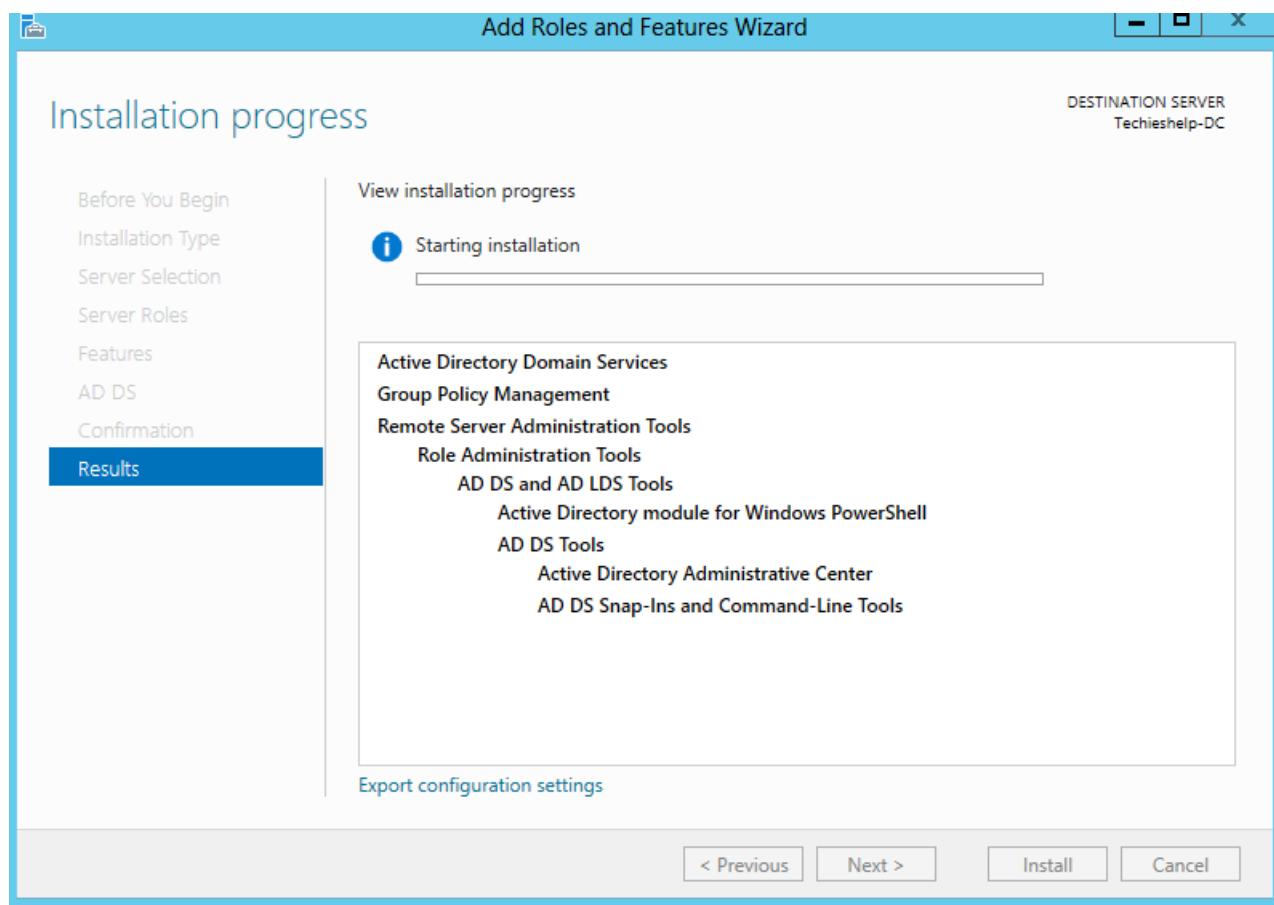


Once selected you will be prompted with the add features option. Select all the defaults by choosing Add Features. Once you are back at the Select Server Roles screen click next. You will be asked if you want to install any additional features. Click next as we do not need to.

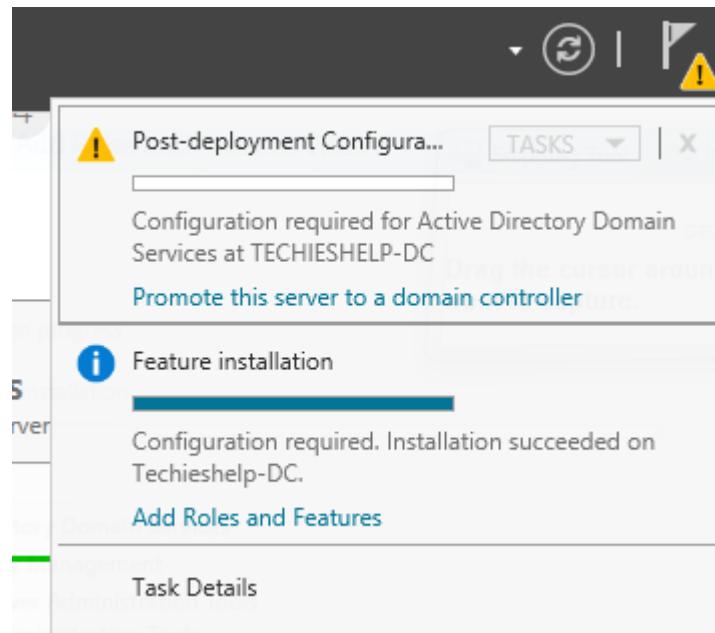
You are now prompted with the installation of the Active Directory Domain Services install. Click next to continue.



You will see the summary screen. if you had multiple servers in a group you would put a tick in restart destination server automatically. Click install to commence the active directory services install. The process will start to install the roles as seen below.

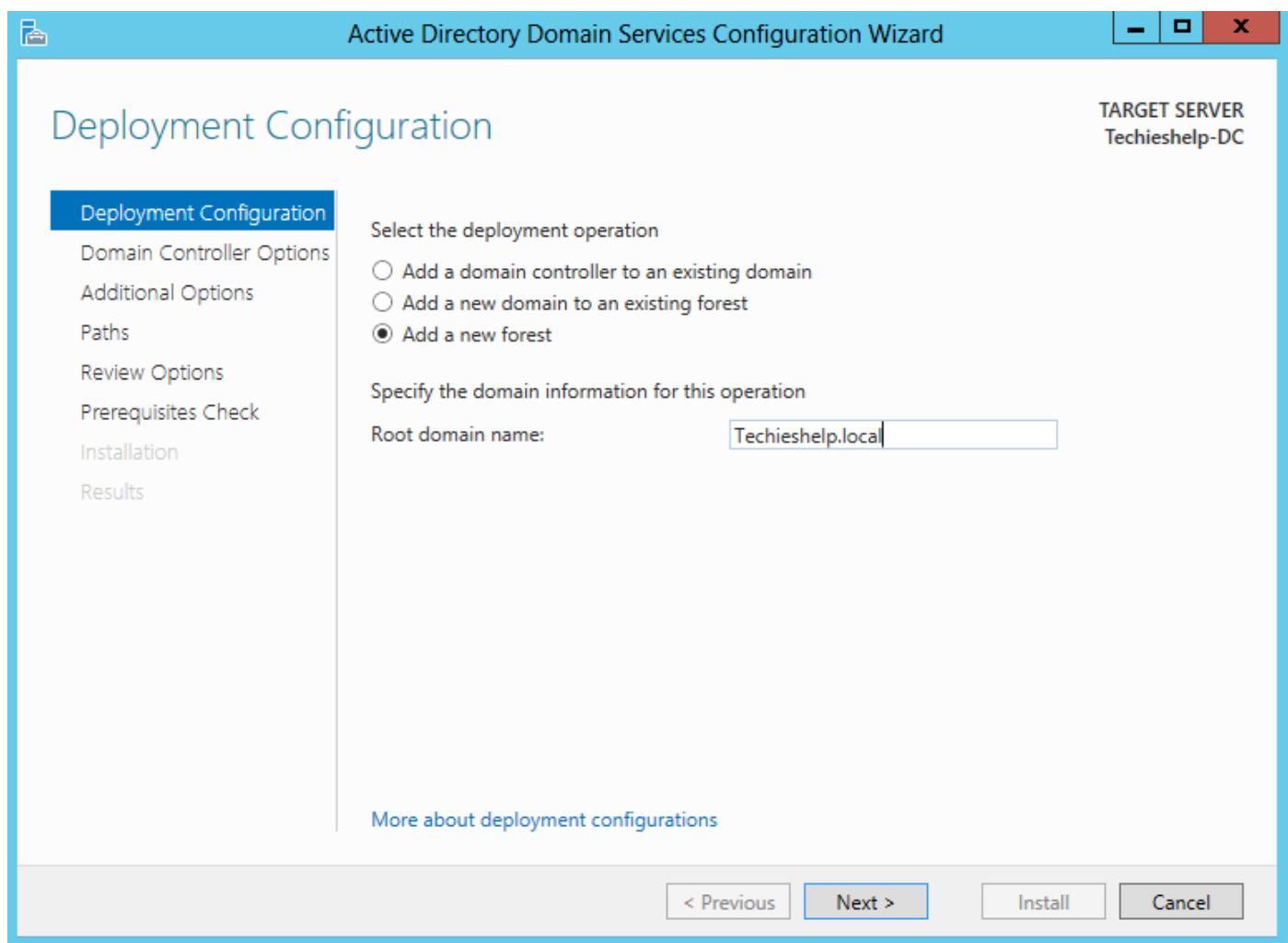


Once the install is complete click close. You would think that is it but you have not yet created the domain. In previous version the DCPROMO command would of been used to install active directory and run the promotion process, DCPROMO is no more. You will now see at the top of server manager a warning sign under notifications, click it and you will see "Promote this server to be a domain controller." Click this option.

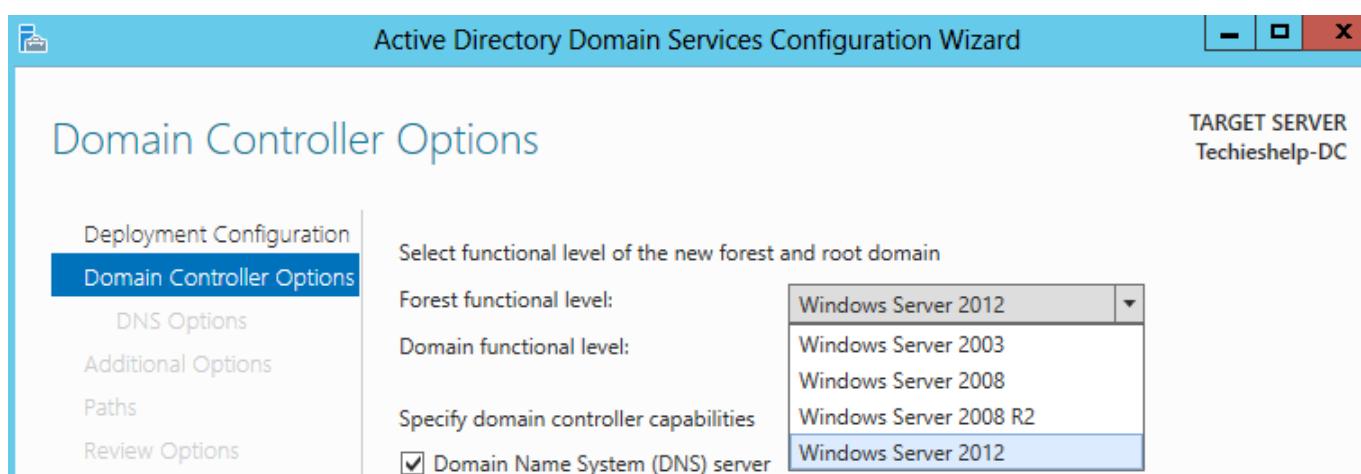


Promoting Server 2012 to Be a Domain Controller

As we are creating a new domain, on the screen below you will see that we need to select “Add to a new forest” and also enter the name we would like to call our new 2012 root domain. Do so and click Install.



You now need to select your 2012 domain controller options, when you choose the functional level you are basically saying I want no domain controllers older than this functional level. So as this is a new domain I will only be installing server 2012 DC's in it.



Leave the defaults in place such as DNS server role and also enter the Directory Services Restore mode password. Then click next. You will see a DNS delegation error, you can ignore that as it is a new domain. Click next.

You then will need to confirm your NETBIOS name, if you are happy then again click next.

Verify the NetBIOS name assigned to the domain and change it if necessary  
The NetBIOS domain name:

Now you can select where you want the active directory database to be stored, I just leave the defaults and click next.

Specify the location of the AD DS database, log files, and SYSVOL

Database folder:	C:\Windows\NTDS	<input type="button" value="..."/>
Log files folder:	C:\Windows\NTDS	<input type="button" value="..."/>
SYSVOL folder:	C:\Windows\SYSVOL	<input type="button" value="..."/>

You will see the review screen, if you are happy with the results then click next. You can now finally select Install. Do so. The server will now be promoted to be a domain controller and will hold all the FSMO roles. During this process you will be logged out and the server will reboot.

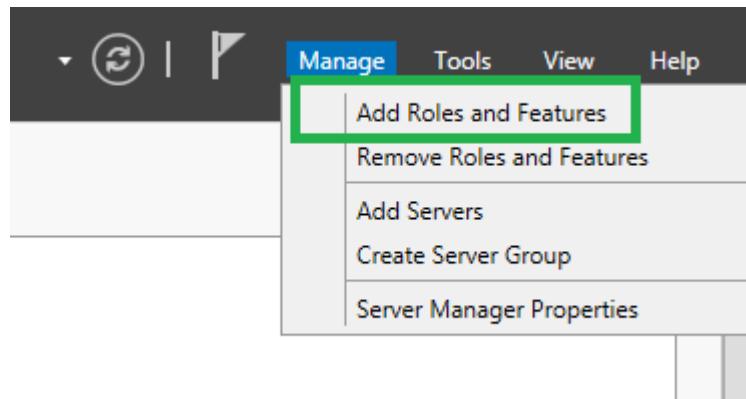
Your domain is now built and ready to accept users to be created and PC's to be joined to the domain. Before doing so you may want to install DHCP on Server 2012 so the PC's get valid IP addresses and also install your anti-virus package.

## Appendix 78: Windows Server 2012 R2 – Active Directory Installation

### I. Install Active Directory

#### 1. Add Roles and Features

First, Open server manager-> Select Add roles and features from Dashboard/Mange options.



Select next on Add Roles and Features Wizard page.

#### 2. Installation Type

Select Role based features option in Add Roles and Features Wizard page. Do not select “Remote Desktop Services Installation” type.



#### 3. Select Server and Server Role

Select the server from the server pool. It will automatically show the server in the list. Typically, you'll see only your server in this list.

Select Active Directory Domain services in Roles list as shown below.

## Select server roles

Before You Begin

Installation Type

Server Selection

**Server Roles**

Features

AD DS

Confirmation

Results

Select one or more roles to install on the selected server

### Roles

- Active Directory Certificate Services
- Active Directory Domain Services
- Active Directory Federation Services
- Active Directory Lightweight Directory Services
- Active Directory Rights Management Services
- Application Server
- DHCP Server

## 4. Add Features

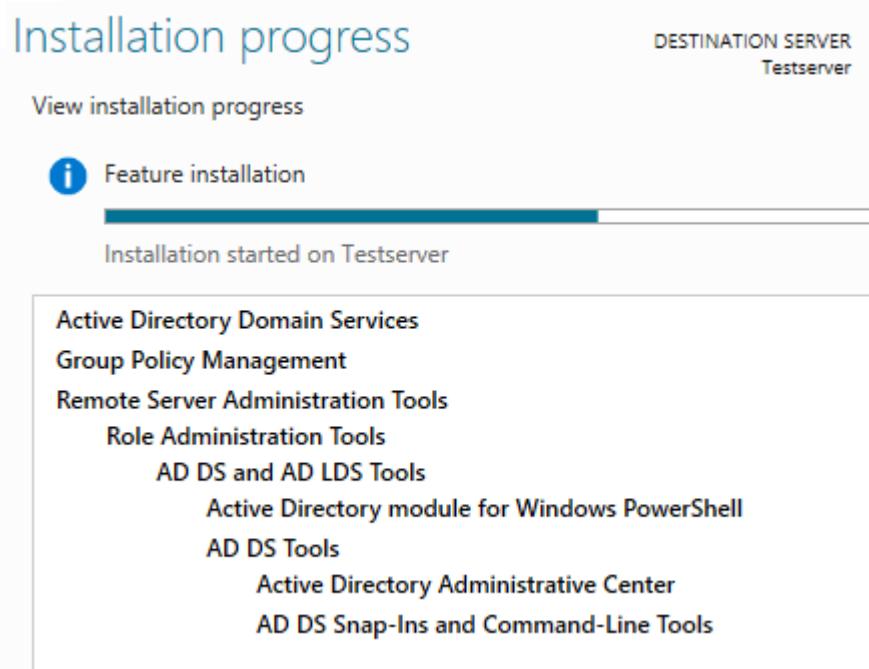
After selecting Role it will popup a window to install additional services, Choose add features from popup window.

If you want to install any other additional features we can select from this page.

## 5. Install AD

Select next in Add Roles and Features Wizard page.

Confirm the installation selections. Check the Restart check box to restart server automatically after installation.



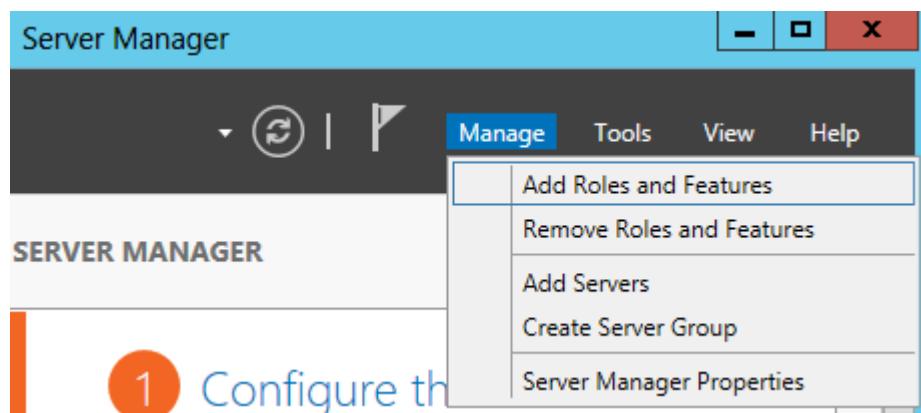
## Appendix 79: Windows Server 2012 R2 - Group Policy Management Console Installation

Managing Active Directory and Group Policy can be a little obscure due to the prerequisite of installing the Remote Server Administration Tools on Windows 7 and 8. In Server 2012, there is no separate install of the RSAT tools, you just have to know where to look. Fortunately, it proves consistent by being part of the Add/Remove Roles and Features part of the Windows

Server operating system. I like the role-based installations because it greatly simplifies the install process, provides you a list of Server's native capabilities, and keeps the installation minimal by allowing you to manually choose what you want installed after the fact.

To get the Active Directory Users and Computers, you want to be sure to install just the tools you need, not the entire domain services on your server. That is, unless you wish to make your server a domain controller.

Open up Server Manager by clicking the icon pinned to the Taskbar or right-clicking Computer and going to Manage. In the top-right corner of the window, go up to the Manage menu and click 'Add Roles and Features'.

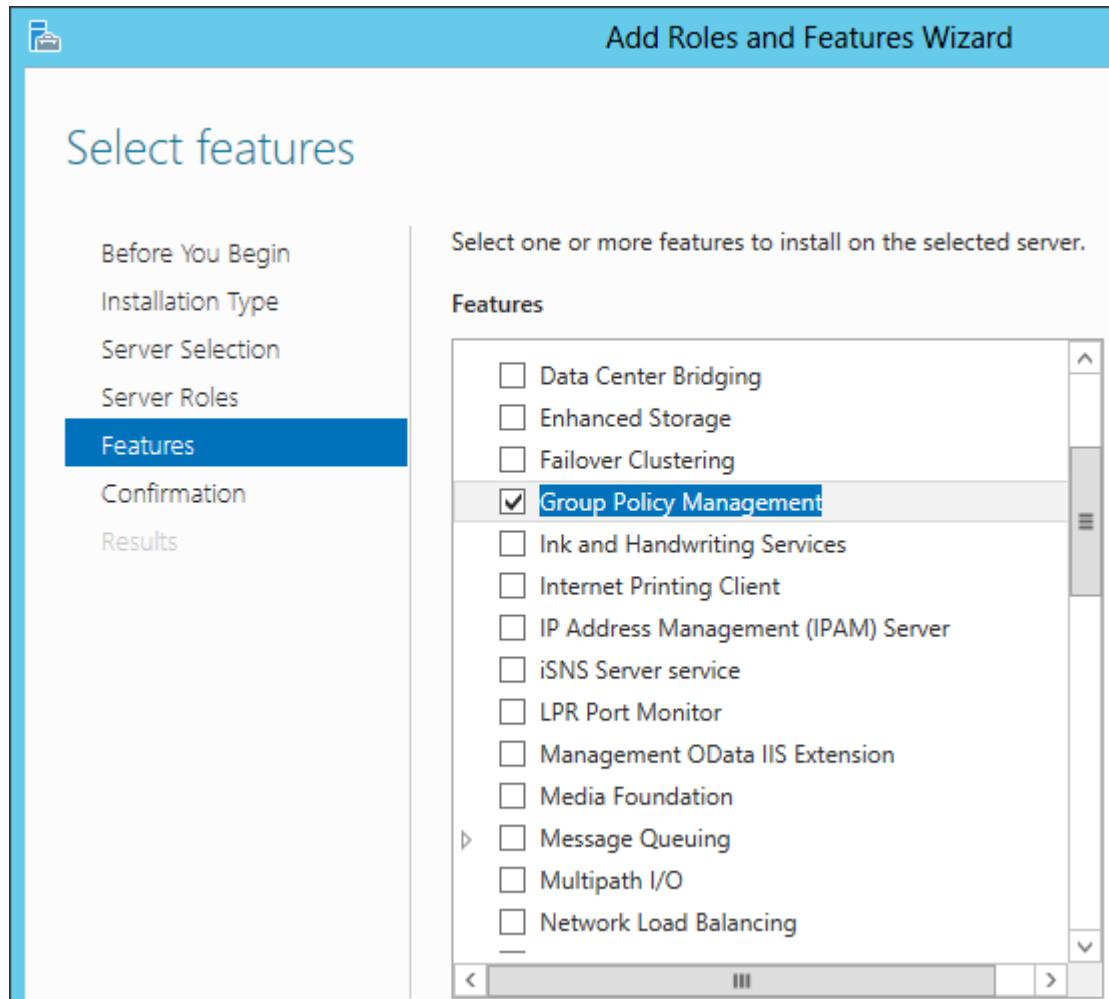


From here, you will go through a dialog wizard. Follow the on-screen instructions to get to the install on the server you want configured. Choose Role-based or feature-based installation and select your server.

Unless there are other roles you would like installed, skip Server Roles and hit Next to get to the Features.

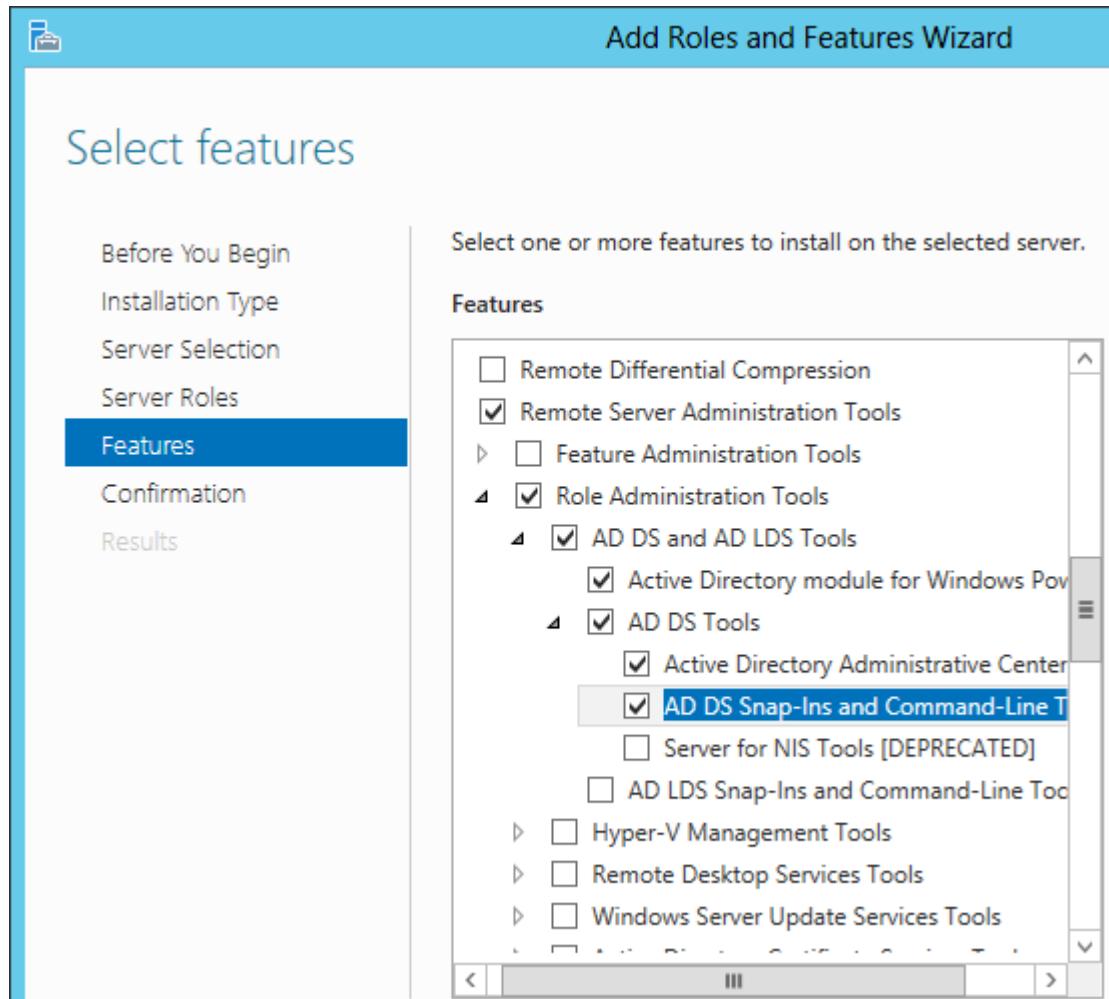
On the Features page, check Group Policy Management Tools.

The description reads: Group Policy Management is a scriptable Microsoft Management Console (MMC) snap-in, providing a single administrative tool for managing Group Policy across the Enterprise. Group Policy Management is the standard tool for managing Group Policy.



Scroll down a little bit to get to and Remote Server Administration Tools -> Role Administration Tools -> AD DS and AD LDS Tools and check those boxes, particularly AD DS Snap-Ins and Command-Line Tools.

The description reads: Active Directory Domain Services Snap-Ins and Command-Line tools includes Active Directory Users and Computers, Active Directory Domains and Trusts, Active Directory Sites and Services, and other snap-ins and command-line tools for remotely managing Active Directory domain controllers.



You can also select other tools you want like the Active Directory Administrative Centre but to specifically get just Active Directory Users and Computers, check the box in front of AD DS Snap-Ins and Command-Line Tools.

Confirm your selections and let the install do its work.

## Add Roles and Features Wizard

### Confirm installation selections

Before You Begin

Installation Type

Server Selection

Server Roles

Features

**Confirmation**

Results

To install the following roles, role services, or features on selected

[Restart the destination server automatically if required](#)

Optional features (such as administration tools) might be displayed  
been selected automatically. If you do not want to install these op  
their check boxes.

[Group Policy Management](#)

[Remote Server Administration Tools](#)

[Role Administration Tools](#)

[AD DS and AD LDS Tools](#)

[Active Directory module for Windows PowerShell](#)

[AD DS Tools](#)

[Active Directory Administrative Center](#)

[AD DS Snap-Ins and Command-Line Tools](#)

Once the installation completes, you will see 'Active Directory Users and Computers' and 'Group Policy Management Console' on the Start Screen. You can also find them under the Administrative Tools folder should you want to copy a shortcut to your desktop.

## Appendix 80: Windows Server 2012 R2 – Dynamic Host Configuration Protocol Setup

### Installing DHCP role via new Server Manager

- Ensure the computer has at least one static IP address assigned before starting the role installation.
- Launch the Add Role Wizard from Server Manager.
- Select DHCP server role and go through the steps needed for installation.
- The last page of the wizard (which comes up after the role has been installed), provides a link – “**Complete DHCP configuration**”. This provides some tasks that need to be performed to enable the DHCP server role to work properly after role installation.

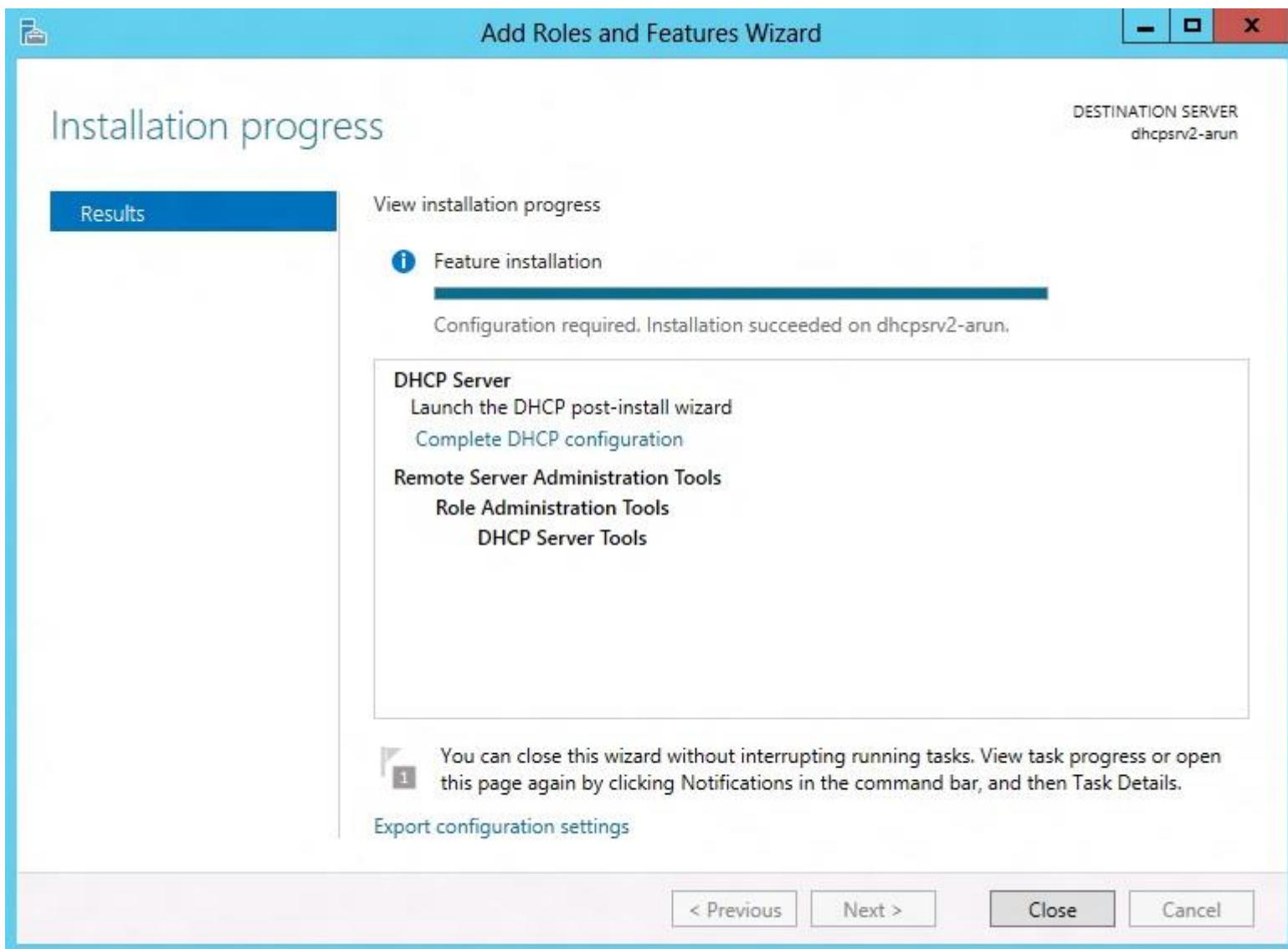


Figure 1: The last page of Add Role Wizard after DHCP role installation

- Launch the DHCP post-install wizard and complete the steps required.
- Creation of DHCP security groups (DHCP Administrators and DHCP Users). For these security groups to be effective, the DHCP server service needs to be restarted. This will need to be performed separately by the administrator.

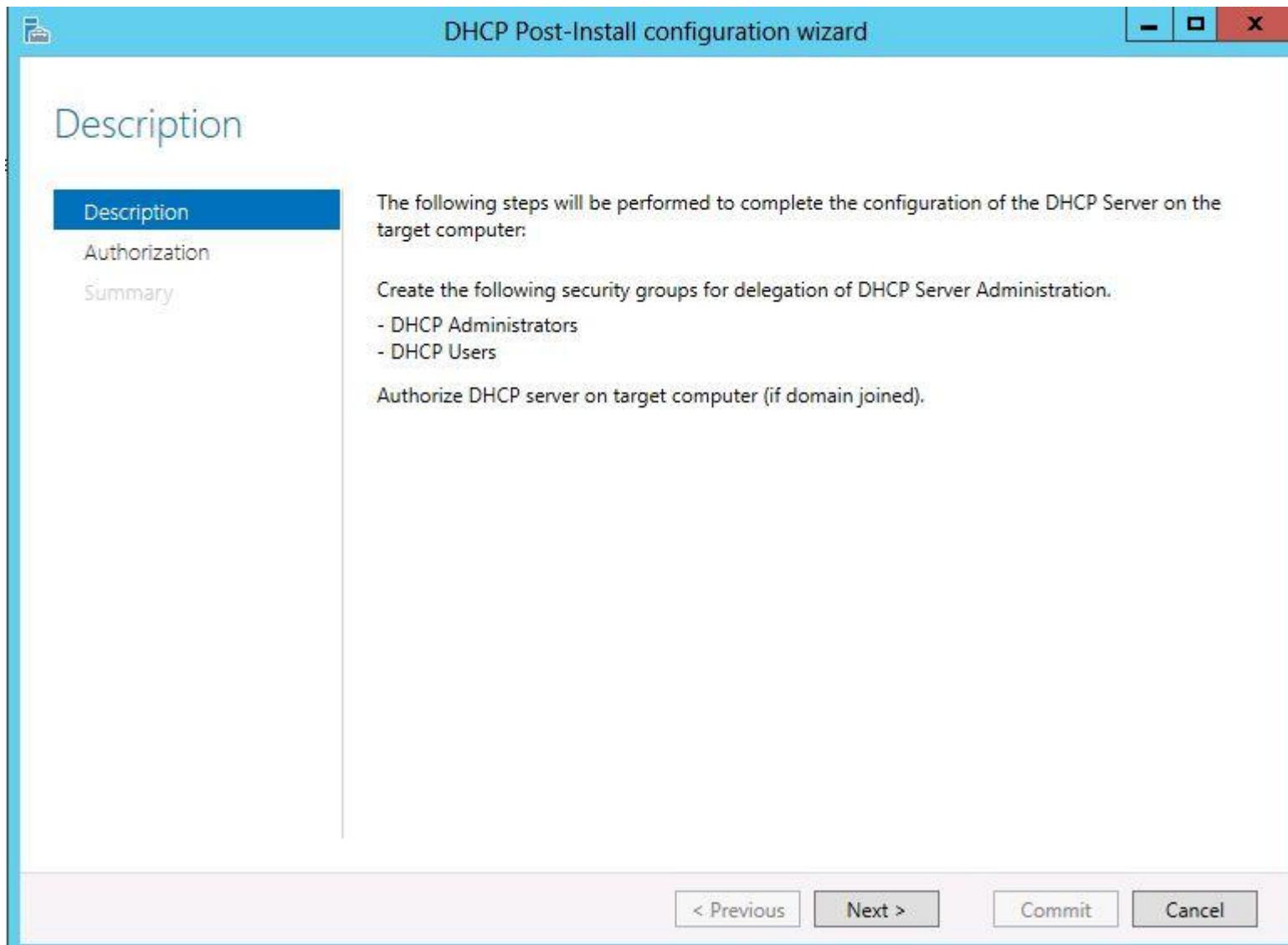


Figure 2: DHCP Post-Install configuration wizard – Introduction Page

- Authorization of DHCP server in Active Directory (only in case of a domain-joint setup). In a domain joined environment, only after the DHCP server is authorized, it will start serving the DHCP client requests. Authorization of DHCP server can only be performed by a domain user that has permissions to create objects in the Net services container in Active Directory. See [how to delegate permissions to do this in active directory](#).

## DHCP Post-Install configuration wizard

### Authorization

Description

**Authorization**

Summary

Specify the credentials to be used to authorize this DHCP server in AD DS.

- Use the following user's credentials

User Name: TEST\administrator

- Use alternate credentials

UserName:

- Skip AD authorization

< Previous

Next >

Commit

Cancel

Figure 3: DHCP Post-Install configuration wizard – Authorization Page

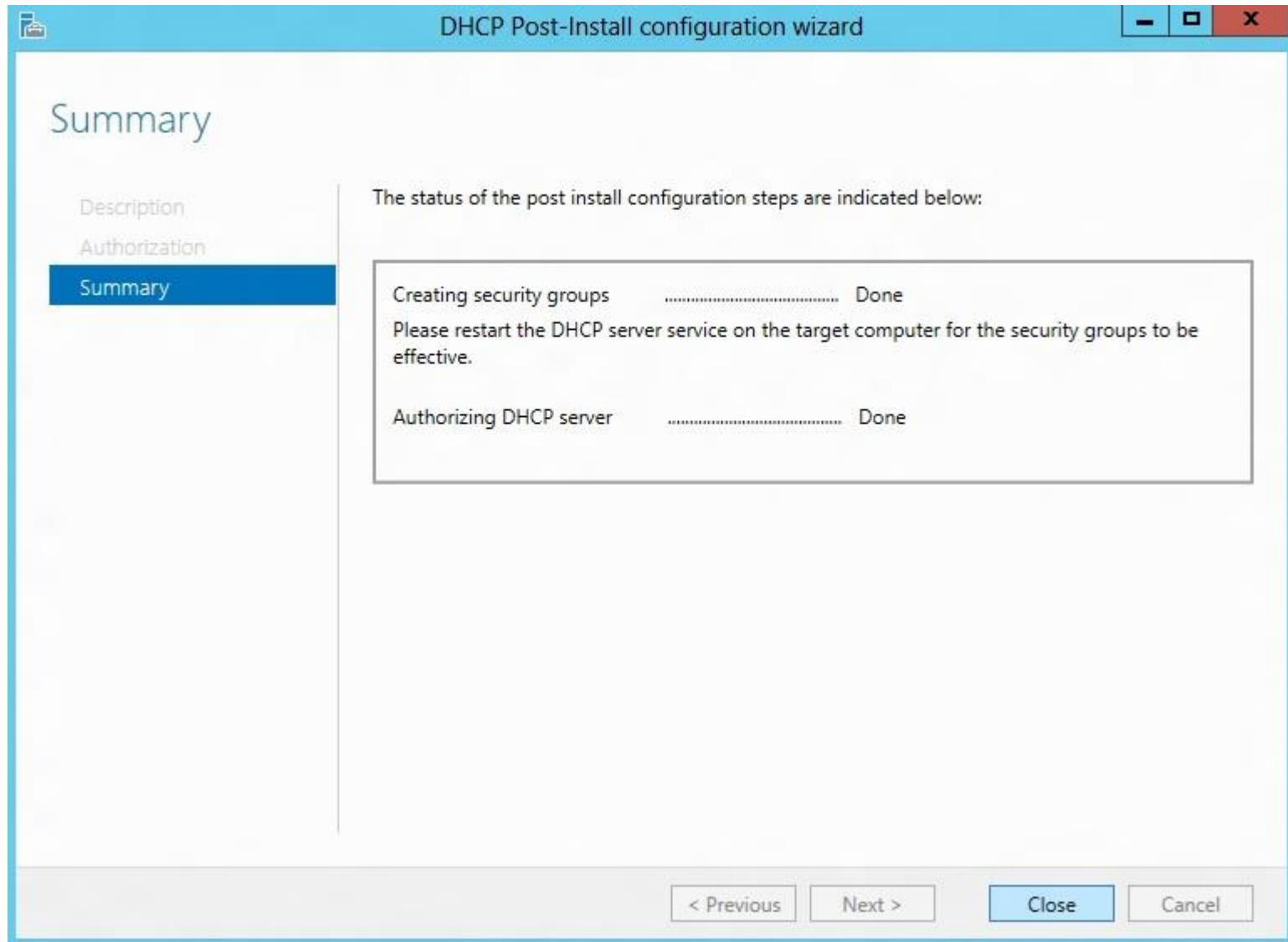


Figure 4: DHCP Post-Install configuration wizard – Summary Page

- In case completing of the post-install step is missed after role installation, the administrator will continue to see a notification on the action pane and also a link on the DHCP role tile on the main Server Manager page suggesting that some configuration is required. That link would go away only after completion of the post-install task.



## Server Manager ▶ Dashboard

### WELCOME TO SERVER MANAGER



1

Configure this local server

2

Add roles and features

3

Add other servers to manage

4

Create a server group

### ROLES AND SERVER GROUPS

Roles: 6 | Server groups: 1 | Servers total: 1

Figure 5: Server Manager: DHCP Post-Install configuration wizard launch point

- The configuration of DHCP server parameters such as scope, options etc. are no longer available in the new Server Manager. The administrator can now launch DHCP MMC either via Server manager (as shown below), or via the DHCP MMC application in the Start Menu, or writing `dhcpmgmt.msc` on the command prompt. The administrator can now create scopes, set option values so as to be able to lease out IP addresses and provide option values to clients.

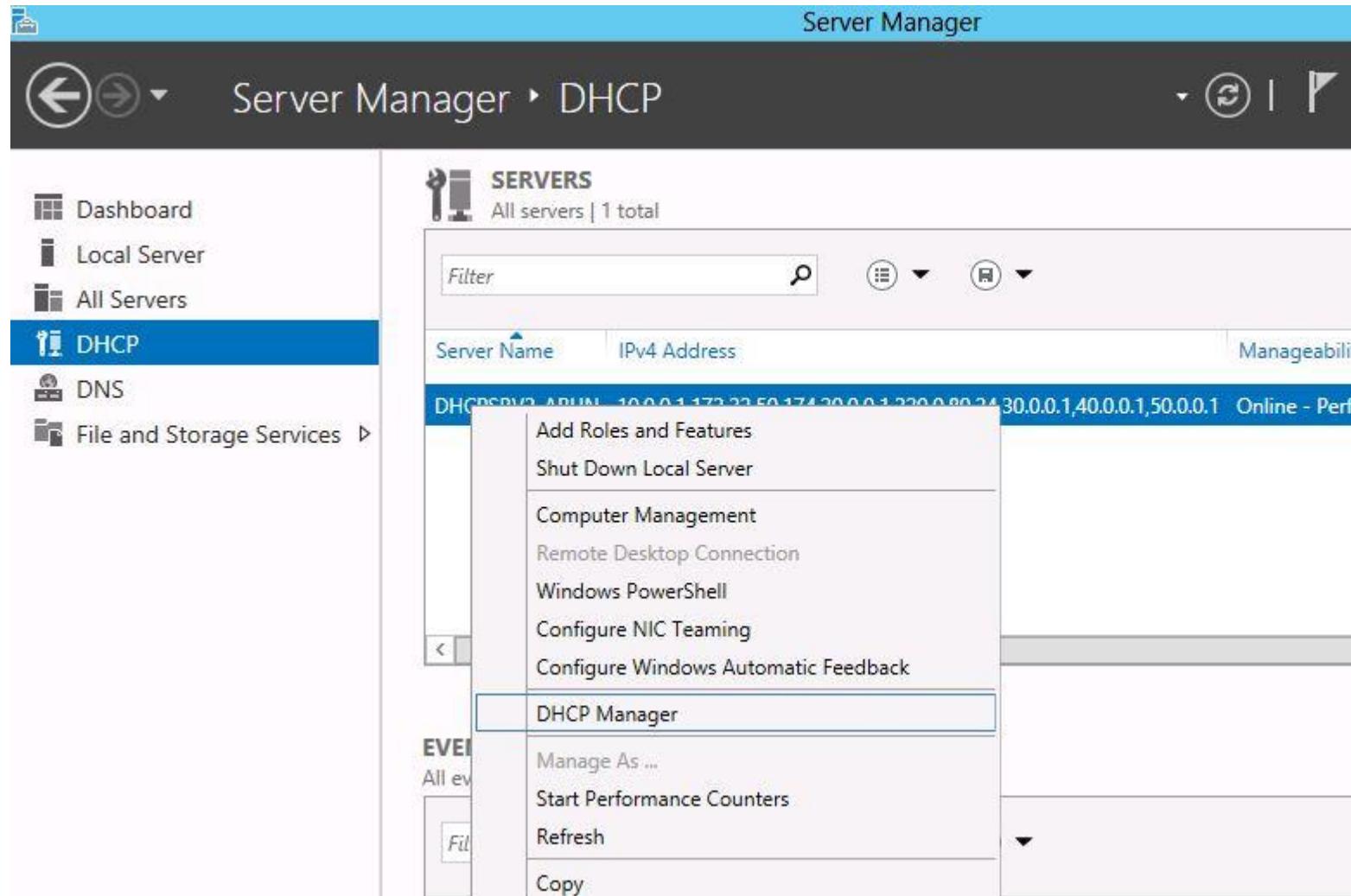
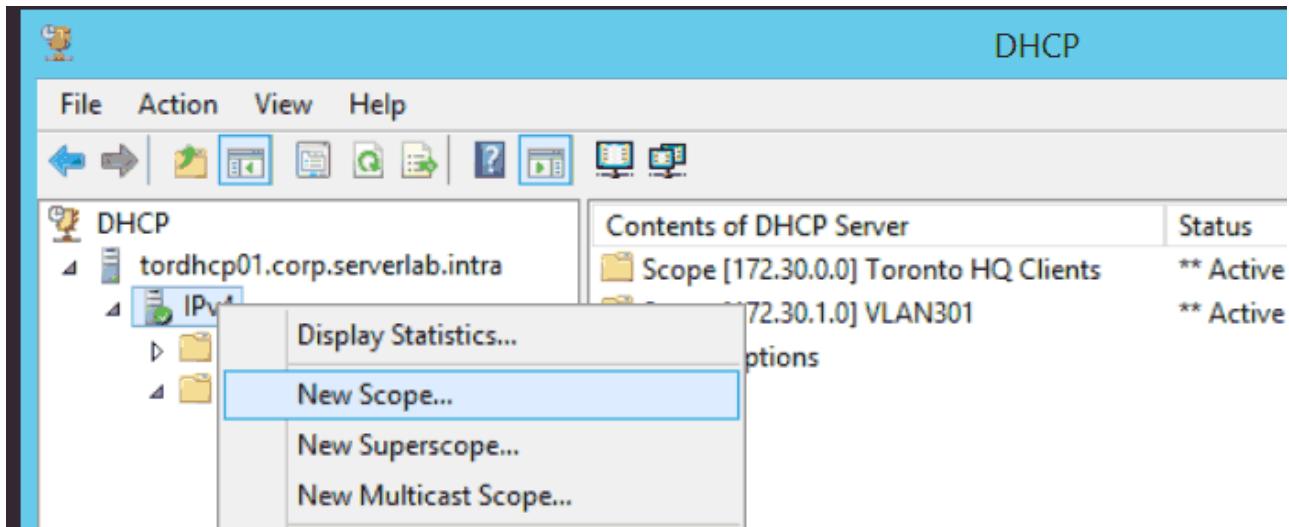


Figure 6: Server Manager: DHCP MMC launch point

#### Appendix 81: Windows Server 2012 R2 - DHCP Creating a scope

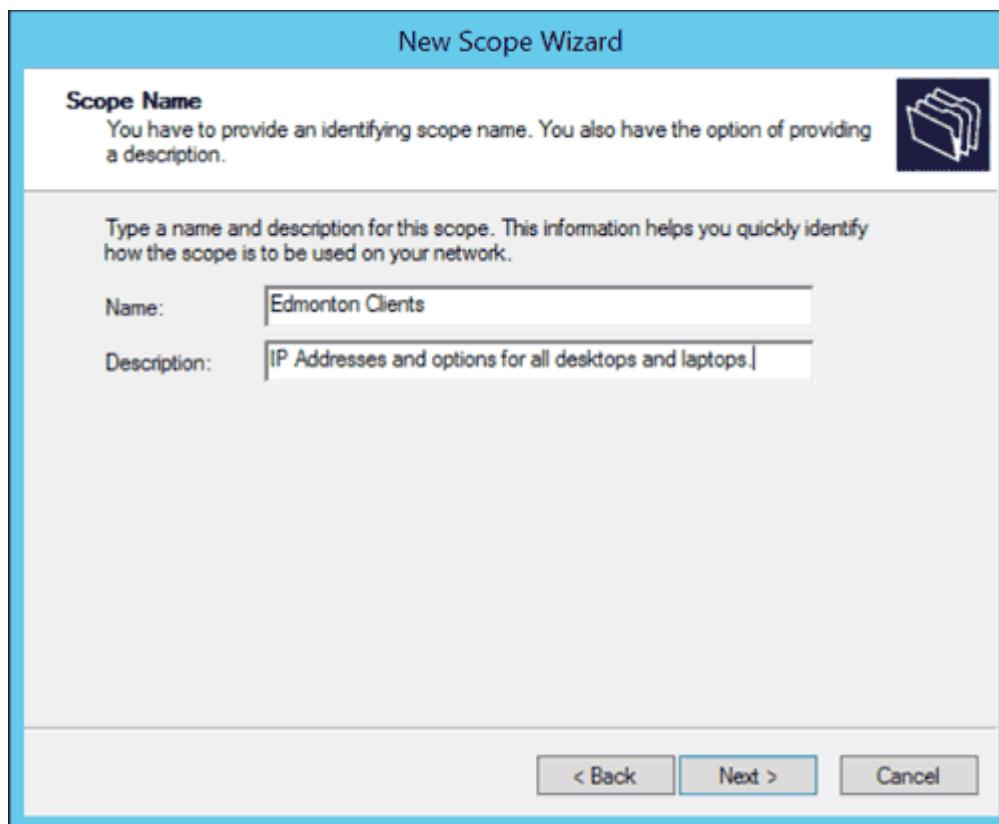
Create a New Scope

1. Launch the DHCP console.
2. From the tree on the left side of the console, expand the DHCP server's hostname node.
3. Select and then right-click **IPv4**.
4. From the IPv4 context menu, select **New Scope**.



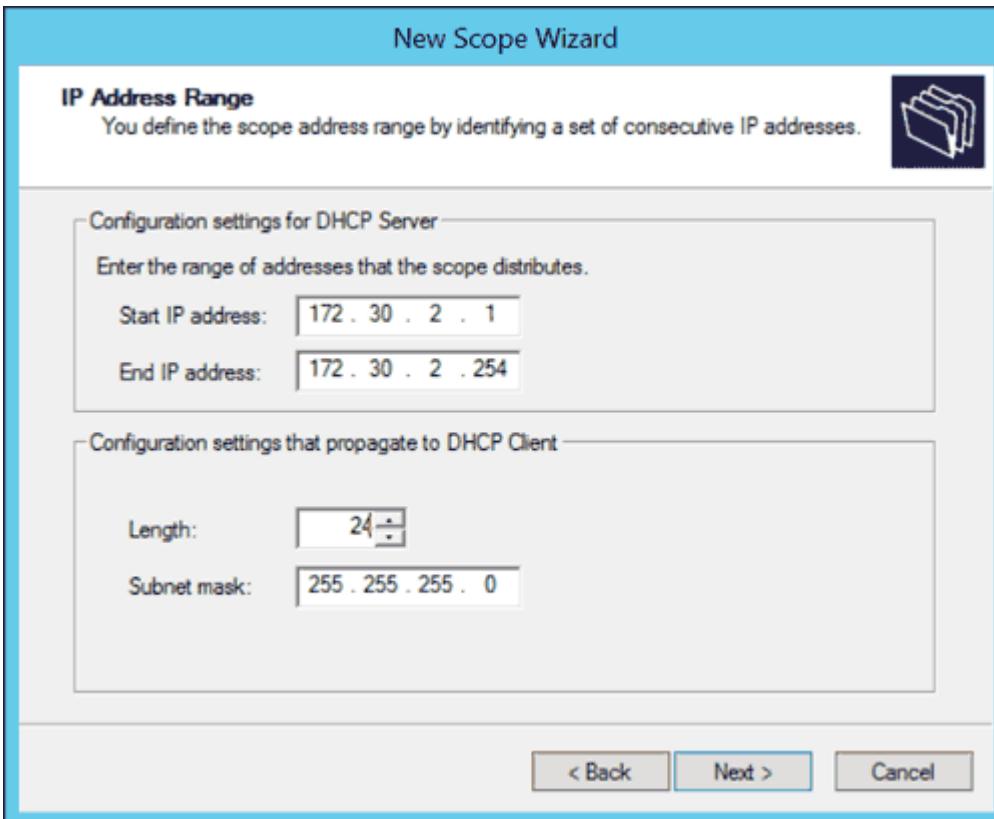
**FIG1** – Windows DHCP New Scope context menu

5. When the **New Scope Wizard** dialog box appears, click **Next**.
6. On the **Scope Name** screen, enter the name of your new scope. You should give it a description to document its purpose. When done, click **Next**.



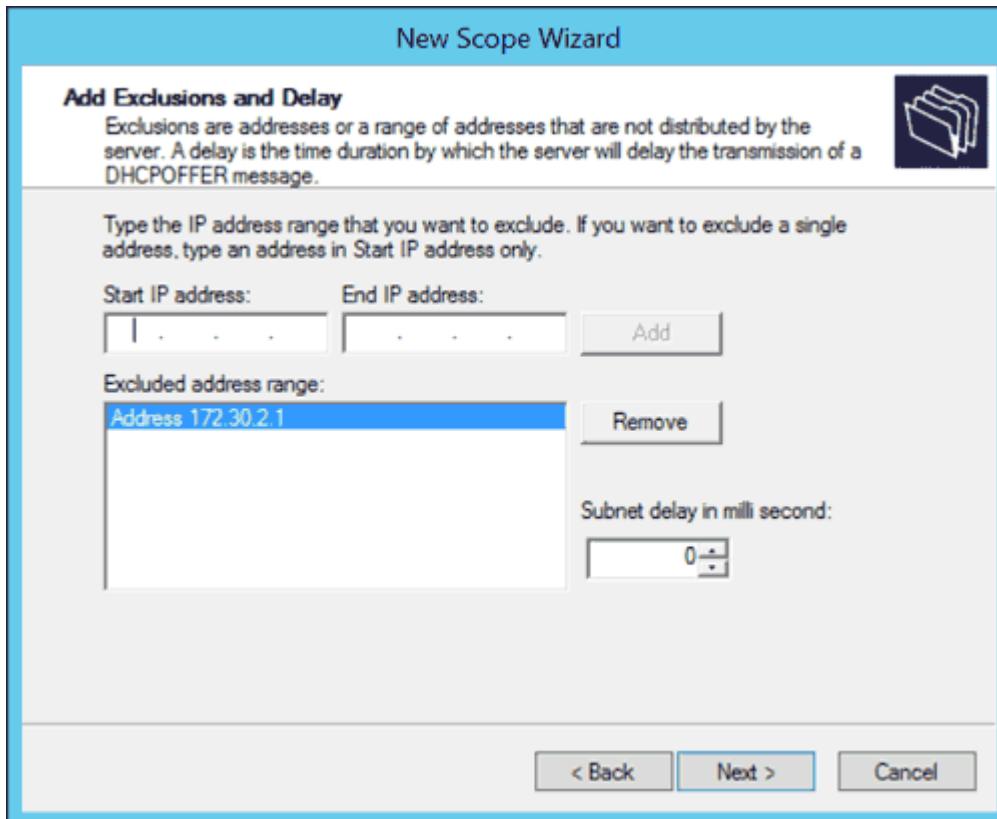
**FIG2** – DHCP New Scope Wizard: Scope Name

7. On the **IP Address Range** screen, enter a starting IP address followed by an Ending IP address. This creates the scope's range, which will be used to assign addresses to clients.
8. Under **Configuring settings that propagate to DHCP client** section of the **IP Address Range** screen, either enter a subnet bit length (CIDR) in the Length field, or enter the dotted decimal notation of the subnet mask.



**FIG3 – Windows DHCP New Scope Wizard: IP Address Range**

9. Click **Next**.
10. On the **Add Exclusions and Delay** screen, we can set IP addresses from within the range we defined that should be excluded. For example, if our range includes the IP address of our network gateway, we probably do not want our clients to use it, so we would add its IP address to the exclusion list. Click **Next** when done.

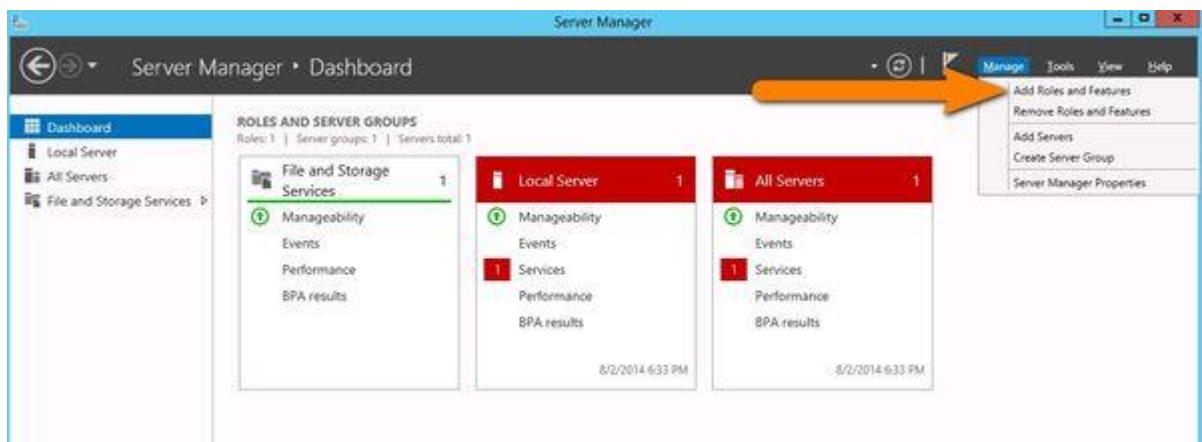


**FIG4 – Windows DHCP New Scope Wizard: Add Exclusions and Delay**

11. On the **Lease Duration** screen, enter the length of time a client should be assigned an IP address. When done, click **Next**.
12. On the **Configure DHCP Options** screen, select **Yes, I want to configure these options now**, and then Click **Next**.
13. On the **Router (Default Gateway)** screen, enter the IP address of the gateway clients should use. Click **Next** when done.
14. On the **Domain Name and DNS Servers** screen, enter the IP addresses of all DNS servers the client should use. Click **Next** when done.
15. On the **WINS Servers** screen, if you have WINS servers add them here. Click **Next** when done.  
Most Windows environments no longer use WINS for name resolution. Although, some legacy applications and hardware may still require it, so check your environment before skipping this.
16. On the **Activate Scope** page, select **Yes, I want to activate this scope now**. A scope must be activated before it is allowed to assign clients IP addresses. If you do not want to activate it at this time, select **No, I will activate this scope later**. Click **Next** when done.
17. Click **Finish**.

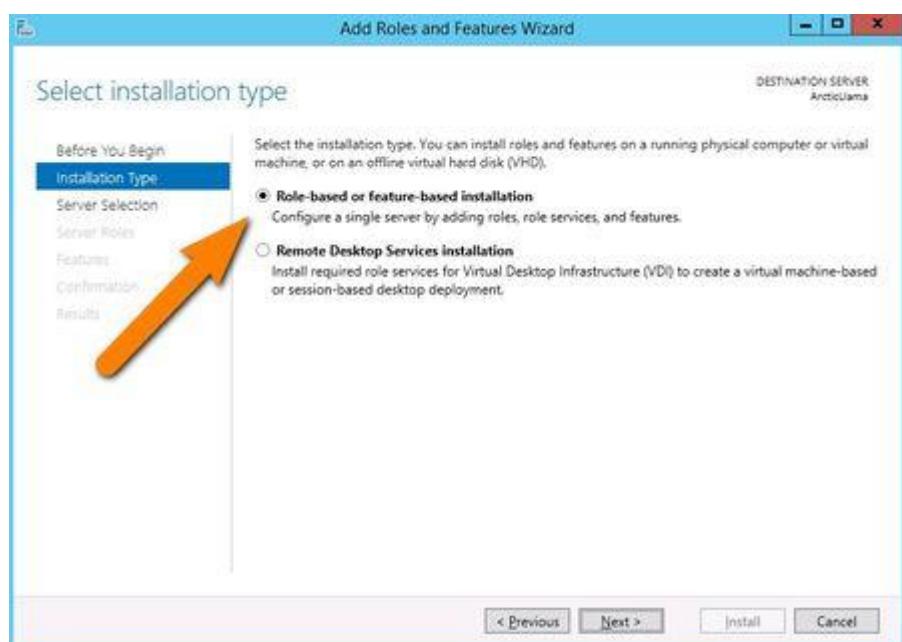
## Appendix 82: Windows Server 2012 R2 – Domain Name System Installation

To add a new role to Windows Server 2012, you use Server Manager. Start Server Manager, click the Manage menu, and then select **Add Roles and Features**.



Click **Next** on the Add Roles and Features Wizard Before you begin window that pops up. (If you checked **Skip this page by default** sometime in the past, that page will, of course, not appear.)

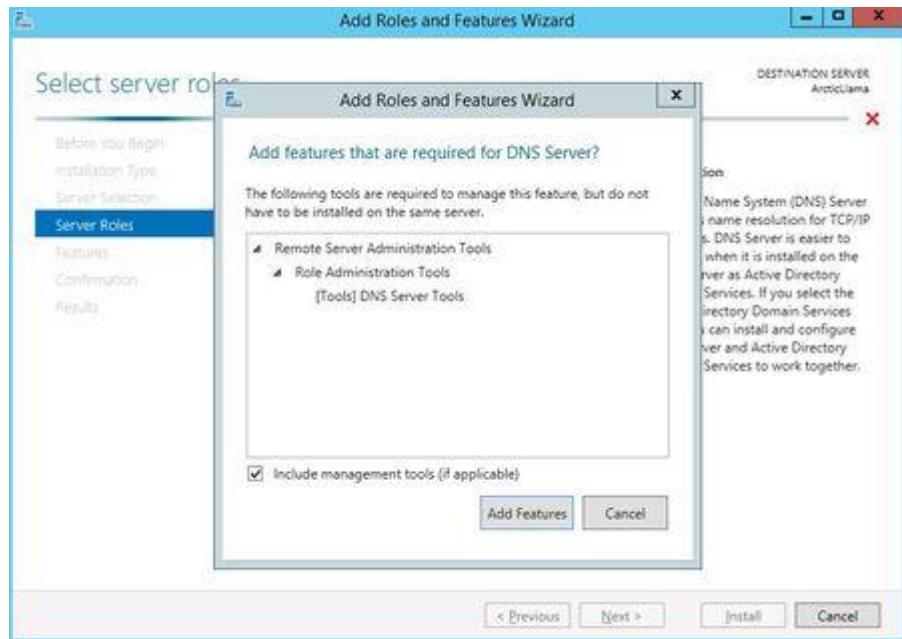
Now, it's time to select the installation type. For DNS servers, you will be selecting the **Role-based or feature-based installation**.



Next, you will choose which server you want to install the DNS server role on from the server pool. Select the server you want, and click next.

At this point, you will see a pop-up window informing you that some additional tools are required to manage the DNS Server. These tools do not necessarily have to be installed on the same server you are installing the DNS role on. If your organization only does remote administration, you do not have to install the DNS Server Tools.

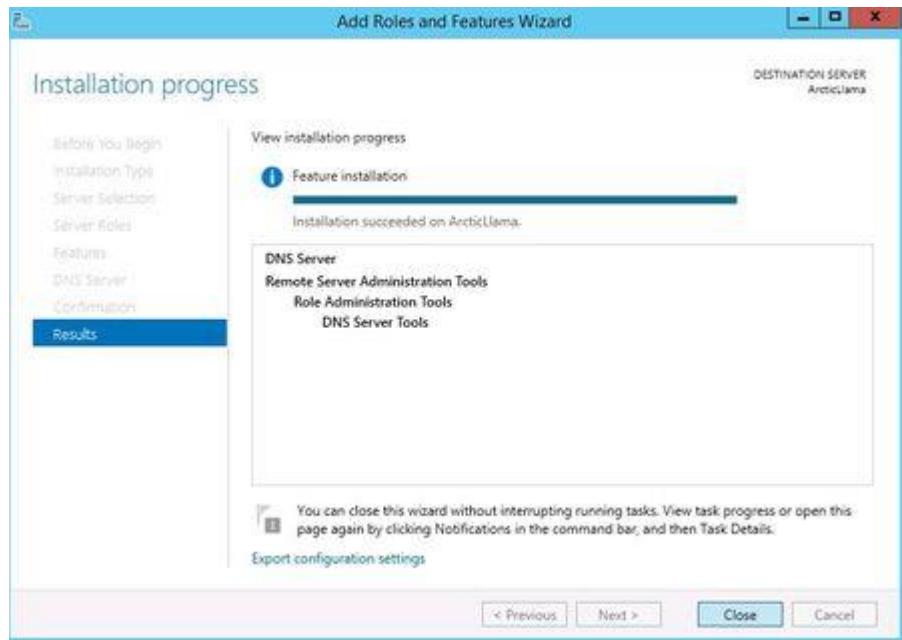
However, in a crunch you may find yourself sitting at the server console or remotely using the console and needing to manage the DNS Server directly. In this case, you will wish you had the tools installed locally. Unless your company policy forbids it, it is typically prudent to install the management tools on the server where the *DNS will be housed*.



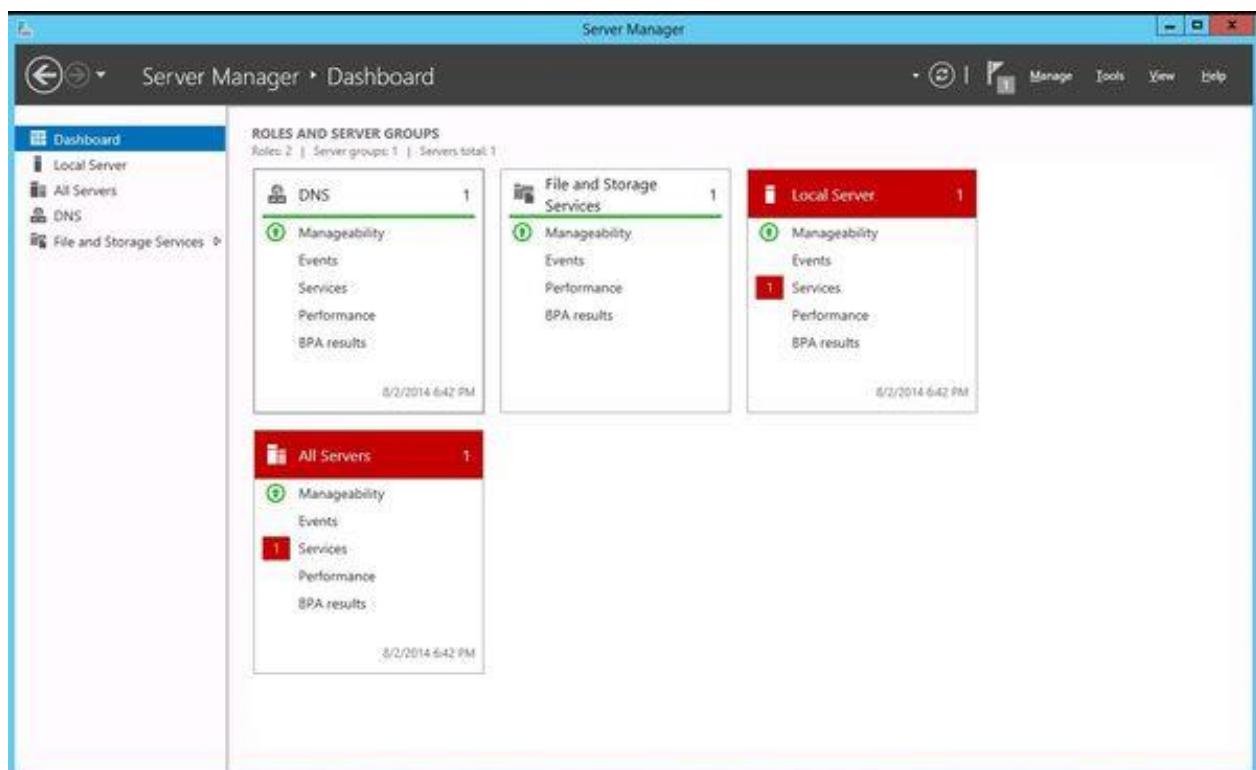
Now you should see the Features window. No need to make any changes here; just click Next.

Next is an informational window about DNS Server and what it does, although one would assume that if you've gotten this far, you are already aware of what it is. Click Next to move on.

This is the final confirmation screen before installation completes. You can check the box to **Restart the destination server automatically**, if you like. Installing the DNS Server does not require a restart, but unless you've planned for the downtime, keep that box unchecked, just in case.



The DNS Server role should now be installed on your server. There should be a new DNS Role tile in your Server Manager.

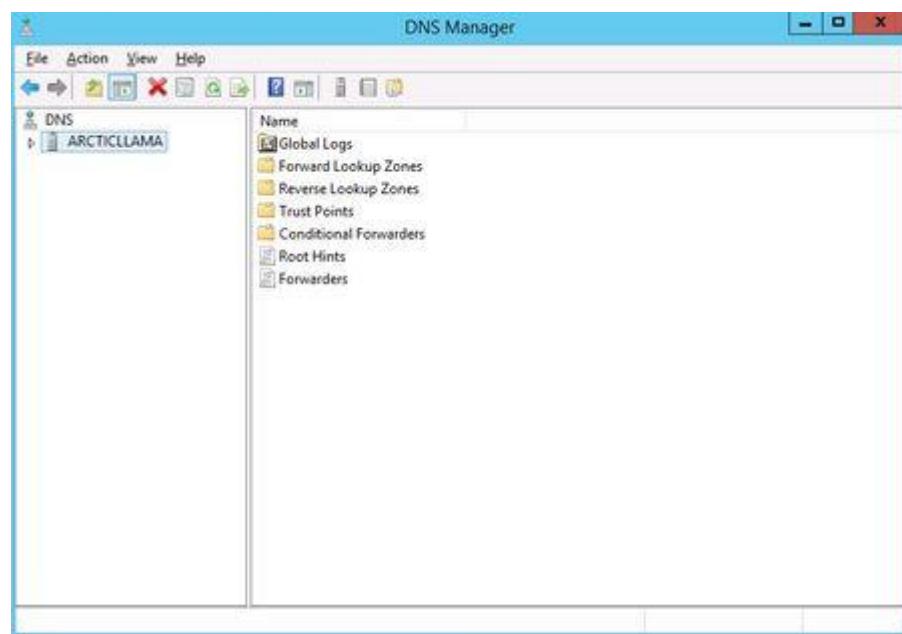


### Configure DNS Server in Server 2012

If you are an old pro with DNS server files, Windows Server 2012 does let you edit the files directly. However, Microsoft recommends that you use the interface tools to avoid errors, especially if you are integrating DNS with Active Directory.

If you want to use the command line to configure your DNS, use the **dnscmd** command. For those of us who don't memorize TechNet for fun, a few clicks is all it takes.

Within Server Manager, to configure the DNS Server, click the Tools menu and select **DNS**. This brings up the DNS Manager window.



We need to configure how the DNS server will work before adding any actual records. Select the DNS server to manage, then click the Action menu, and select **Configure a DNS Server**. This brings up the Configure a DNS Server wizard.



There are three options here. You can either: configure a forward lookup zone only, create forward and reverse lookup zone, or configure root hints only.

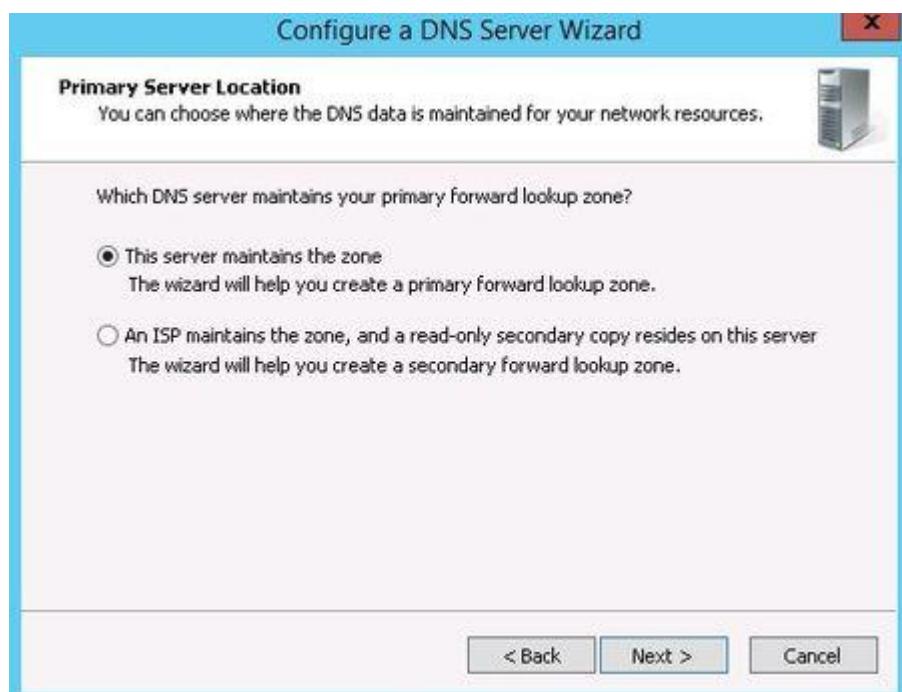
A forward lookup zone allows you to do the standard DNS function of taking a name and resolving it into an IP address.

A reverse lookup zone allows you to do the opposite, taking an IP address and finding its name. For example, if a user is set up to print to a printer with an IP address of 10.20.12.114, but you need to know what name that printer goes by so you can find it, a reverse lookup can help. ("Ah, hah! It's you Third Floor Vending Room Printer #1. Why you give me so much trouble?")

Root hints only will not create a database of name records for lookups, but rather will just have the IP addresses of other DNS servers where records can be found. If you already have DNS setup on your network, you'll probably want to continue using the same configuration you already have. If not, use forward and backward for most situations. (Backup zones typically don't hurt anything, and they are nice to have when the need arises.)

After you've made your selection, click Next.

Now, you choose whether this server will maintain the zone, or if this server will have a read-only copy of the DNS records from another server.

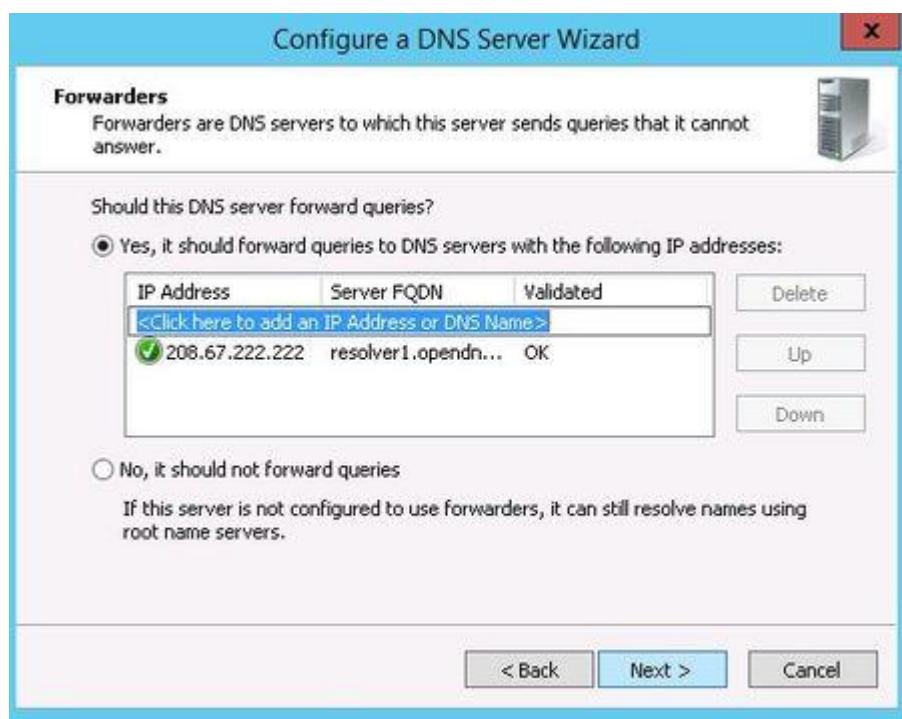


Next enter your zone name. If this is your first DNS server, then this needs to be the root zone name for your entire organization. For example, my zone name might be arcticllama.com. If however, this server will be authoritative only for a subset, and other DNS servers will be responsible for other zones, then the name will need to reflect that. For example, us.arcticllama.com would be the zone name for just the American part of my vast corporate empire :) Click next when you have entered the name.

Now, you need to choose the file name where the DNS records will be stored. The default filename is to add a **.dns** extension to the name of the zone you chose in the previous window. Unless you have a corporate policy stating otherwise, stick with the convention to make things easier on yourself down the line.

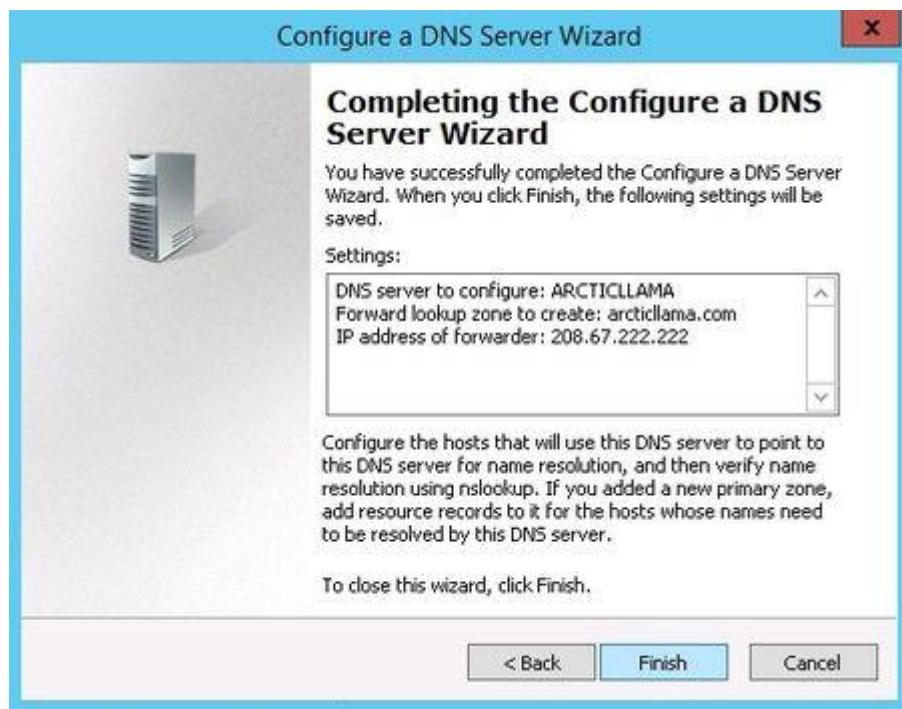
Next you select how this server will respond to Dynamic Updates. Although there are three choices here, only two should actually be used in production. Select the first option to **allow only secure dynamic updates** if you are integrating your DNS with Active Directory. Select **do not allow dynamic updates** if your DNS is not integrated with Active Directory and you don't want to allow dynamic updates. Do not allow unsecured dynamic updates unless you really know what you are doing and have a very good reason for doing so.

Up next is the option to configure forwarders. If your DNS server ever gets a query for which it has no record, it can forward that request on to another DNS server to see if it has the answer.



For example, in order to provide name resolution for internet connectivity, you can input your ISP name servers here, or use a DNS provider such as OpenDNS. You can (and should) have more than one server listed in case a DNS server is unreachable for some reason. The order forwarders are listed in is the order they are tried, so place your faster and most reliable forwarder at the top of the list.

Click Next and your DNS server is now configured and ready for use.



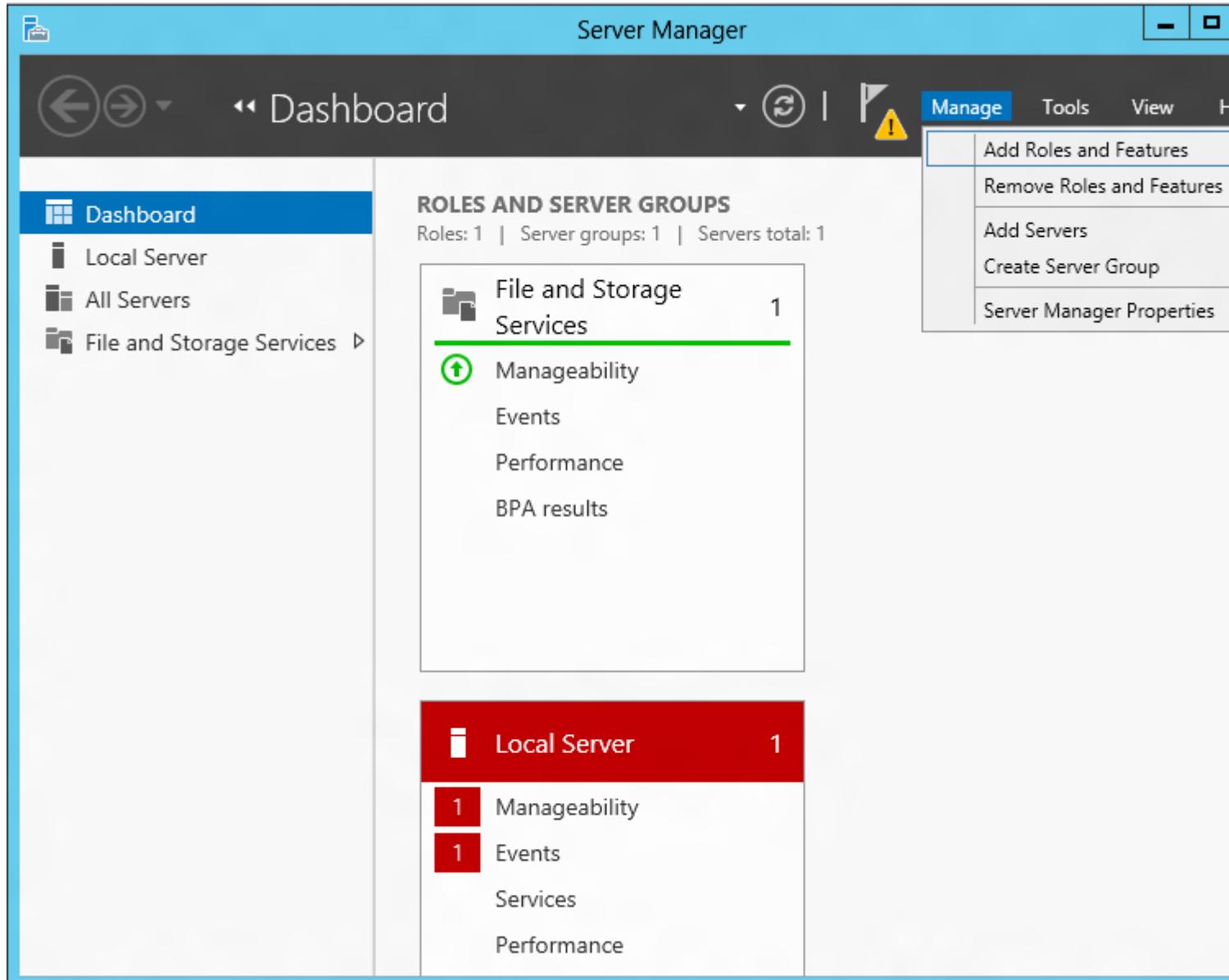
## Appendix 83: Windows Server 2012 R2 – Internet Information Services Installation

### INSTALLING IIS 8 WITH THE DEFAULT SETTINGS

To install IIS 8, use the following steps:

1. Open Server Manager.

2. Under **Manage** menu, select **Add Roles and Features**:



3. Select **Role-based or Feature-based Installation**:

Add Roles and Features Wizard

## Select installation type

DESTINATION SERVER  
WIN2012DEM

Before You Begin

**Installation Type**

Server Selection

Server Roles

Features

Confirmation

Results

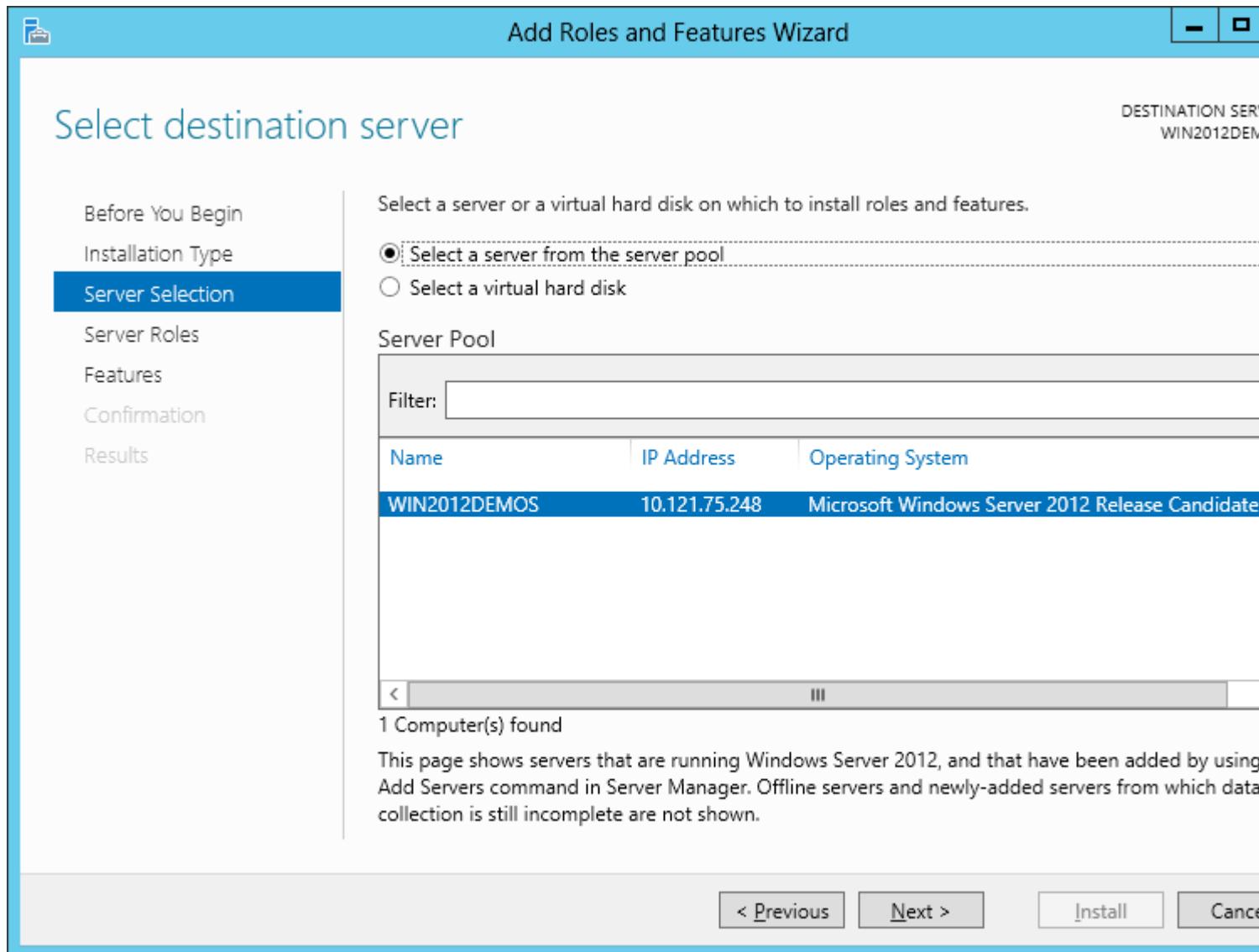
Select the installation type. You can install roles and features on a running physical computer or virtual machine, or on an offline virtual hard disk (VHD).

**Role-based or feature-based installation**  
Configure a single server by adding roles, role services, and features.

**Remote Desktop Services installation**  
Install required role services for Virtual Desktop Infrastructure (VDI) to create a virtual machine-based or session-based desktop deployment.

< Previous    Next >    Install    Cancel

4. Select the appropriate server (local is selected by default), as shown below:



5. Select Web Server (IIS):

Add Roles and Features Wizard

DESTINATION SERVER  
WIN2012DEM

## Select server roles

Before You Begin  
Installation Type  
Server Selection  
**Server Roles**  
Features  
Web Server Role (IIS)  
Role Services  
Confirmation  
Results

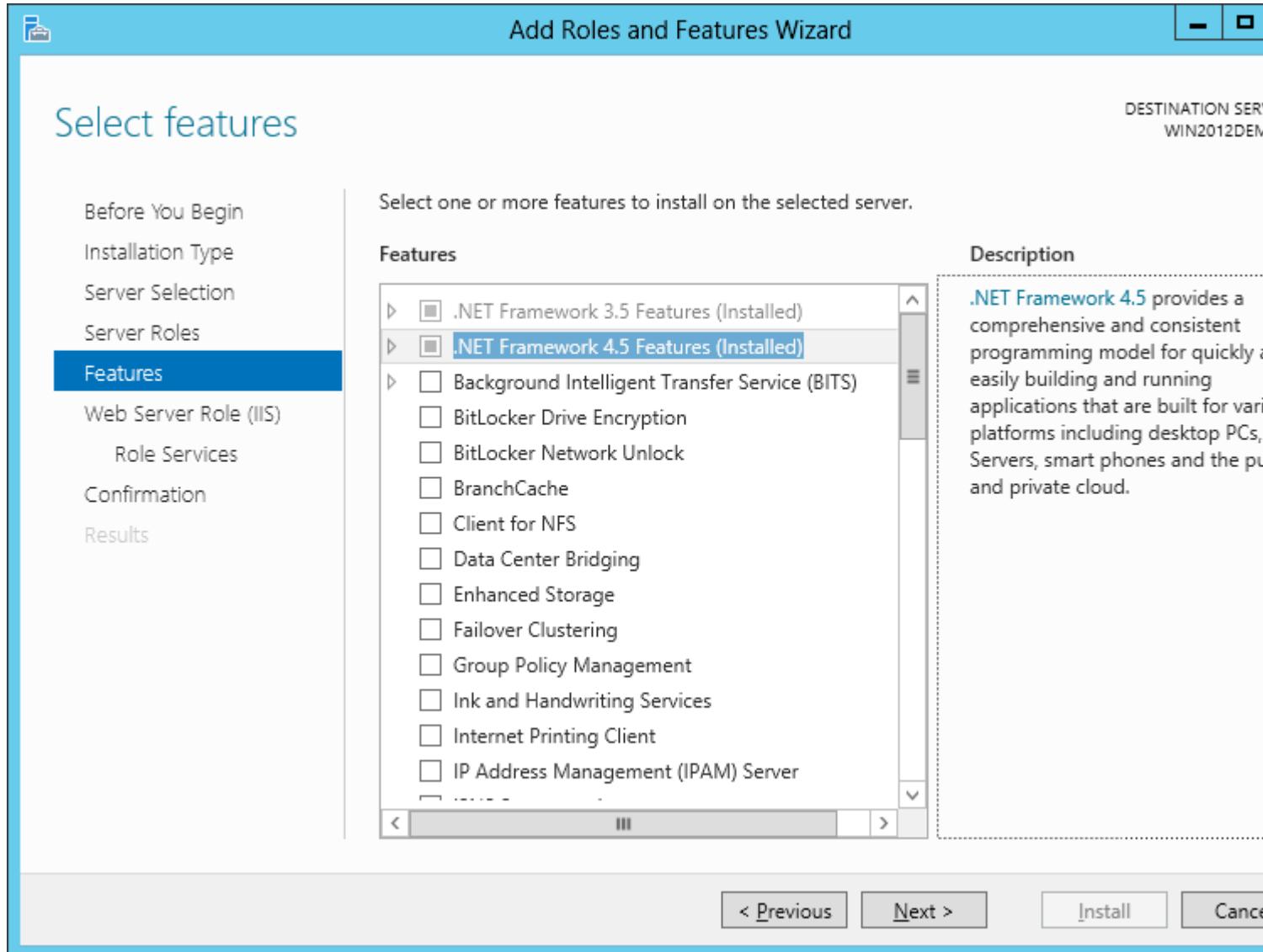
Select one or more roles to install on the selected server.

**Roles**

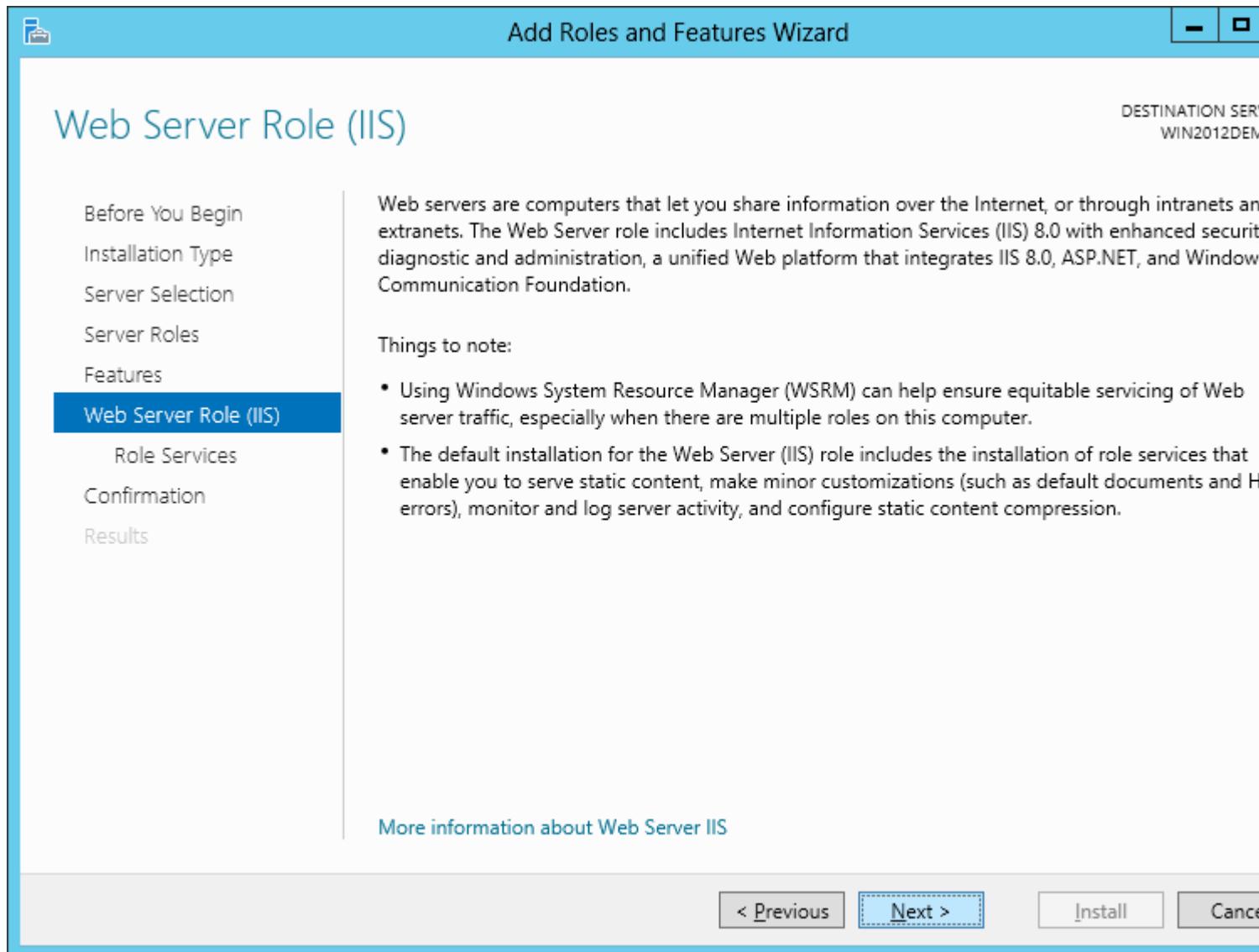
	Description
<input type="checkbox"/> Active Directory Rights Management Services	Web Server (IIS) provides a reliable, manageable, and scalable Web application infrastructure.
<input type="checkbox"/> Application Server	
<input type="checkbox"/> DHCP Server	
<input type="checkbox"/> DNS Server	
<input type="checkbox"/> Fax Server	
<input checked="" type="checkbox"/> File And Storage Services (Installed)	
<input type="checkbox"/> Hyper-V	
<input type="checkbox"/> Network Policy and Access Services	
<input type="checkbox"/> Print and Document Services	
<input type="checkbox"/> Remote Access	
<input type="checkbox"/> Remote Desktop Services	
<input type="checkbox"/> Volume Activation Services	
<input checked="" type="checkbox"/> Web Server (IIS)	
<input type="checkbox"/> Windows Deployment Services	
<input type="checkbox"/> Windows Server Update Services	

< Previous    Next >    Install    Cancel

6. No additional features are needed for IIS, so click **Next**:



7. Click **Next**:



8. Customize your installation of IIS, or accept the default settings that have already been selected for you, and then click **Next**:

9. Click **Install**:

Add Roles and Features Wizard - □

## Confirm installation selections

DESTINATION SERVER  
WIN2012DEM

Before You Begin  
Installation Type  
Server Selection  
Server Roles  
Features  
Web Server Role (IIS)  
Role Services  
**Confirmation**  
Results

To install the following roles, role services, or features on selected server, click **Install**.

**Restart the destination server automatically if required**

Optional features (such as administration tools) might be displayed on this page because they have been selected automatically. If you do not want to install these optional features, click **Previous** to clear their check boxes.

**.NET Framework 4.5 Features**  
ASP.NET 4.5

**Web Server (IIS)**  
Web Server  
Common HTTP Features  
Static Content  
Default Document  
Directory Browsing  
HTTP Errors  
HTTP Redirection

**WILDCARD FEATURES**

**Export configuration settings**  
Specify an alternate source path

[< Previous](#) [Next >](#) [Install](#) [Cancel](#)

10. When the IIS installation completes, the wizard reflects the installation status:

The screenshot shows the 'Add Roles and Features Wizard' window titled 'Installation progress'. On the left, a vertical navigation bar lists steps: 'Before You Begin', 'Installation Type', 'Server Selection', 'Server Roles', 'Features', 'Web Server Role (IIS)', 'Role Services', 'Confirmation', and 'Results'. The 'Results' step is highlighted with a blue background. The main pane displays the 'View installation progress' section, which includes a summary message: 'Feature installation' with a progress bar showing completion, and the text 'Installation succeeded on WIN2012DEMONS.' Below this, a detailed list of installed features is shown under sections like '.NET Framework 4.5 Features', 'Web Server (IIS)', and 'Common HTTP Features'. At the bottom, a note says 'You can close this wizard without interrupting running tasks. View task progress or open this page again by clicking Notifications in the command bar, and then Task Details.' There are also buttons for 'Export configuration settings', 'Close', and 'Cancel'.

DESTINATION SERVER  
WIN2012DEMONS

Before You Begin  
Installation Type  
Server Selection  
Server Roles  
Features  
Web Server Role (IIS)  
Role Services  
Confirmation  
**Results**

View installation progress

**i** Feature installation

Installation succeeded on WIN2012DEMONS.

**.NET Framework 4.5 Features**

- ASP.NET 4.5

**Web Server (IIS)**

- Web Server
- Common HTTP Features**

  - Static Content
  - Default Document
  - Directory Browsing
  - HTTP Errors
  - HTTP Redirection
  - WebDAV Publishing

**1** You can close this wizard without interrupting running tasks. View task progress or open this page again by clicking Notifications in the command bar, and then Task Details.

Export configuration settings

< Previous    Next >    Close    Cancel

11. Click **Close** to exit the wizard.

Summary

## Appendix 84: Windows Server 2012 – Purchasing

### Pricing and licensing overview

Edition	Ideal for...	Feature comparison	Licensing model	Pricing Open NL (US\$)
Datacenter	Highly virtualized private and hybrid cloud environments	Full Windows Server functionality with unlimited virtual instances	Processor + CAL*	\$6,155**
Standard	Low density or non-virtualized environments	Full Windows Server functionality with two virtual instances	Processor + CAL*	\$882**
Essentials	Small business environments for servers with up to two processors	Simpler interface, pre-configured connectivity to cloud-based services; one virtual instance of Essentials	Server (25 User Limit)	\$501**
Foundation	Economical general purpose server with a single processor	General purpose Server functionality with no virtualization rights	Server (15 User Limit)	OEM only

\*CALs are required for every user or device accessing a server. See the Product Use Rights for details.

\*\*Pricing represents Open No Level (NL) ERP. For your specific pricing, contact your Microsoft reseller.

You can purchase Windows Server licenses through multiple channels, providing you with optimum flexibility. Learn more about the channels below and determine the option that best meets your needs.

[Scroll Top](#)

## Word Processing – Appendices

All information relating to word processing:

### *Appendix 85: Microsoft Office 365 Business Premium – Installation*

Download and install Office using Office 365 for business on your PC

---

APPLIES TO: Office 2016, Office 365, Office 365 Admin

Which version do I have?

If your work or school uses Office 365, you can install it after signing in to Office 365 for business in your browser.

The following steps describe how to install the version of Office your admin assigned to you on a PC. For **Office 2016 for Mac**, see Download and install Office 2016 for Mac using Office 365 for business.

**NOTE:** If you're unable to sign in following the steps below you may be signing in to the wrong Office 365 service, see Where to sign in to Office 365. If you have Office 365 Home, Personal, or University, or a one-time purchase of Office such as Office Home & Business 2016, see Download and install or reinstall Office on your PC.

Download and install Office on a PC (laptop, desktop, or 2-in-1)

**IMPORTANT:** The process that installs Office 2016 also uninstalls all Office 2013 products. As you might expect, Word 2013, Excel 2013, and the rest of the Office suite are uninstalled. In addition, if a computer has InfoPath 2013, SharePoint Designer 2013, or certain versions of Visio 2013 or Project 2013 installed, installing Office 2016 also uninstalls those programs. You won't be able to reinstall them. See "Stop, you should wait to install Office 2016" error or How do I reinstall Office 2013 after an Office 2016 upgrade.

If you're unable to sign in following the steps below you may be signing in to the wrong Office 365 service, see Where to sign in to Office 365.

Sign in to Office 365, at <http://portal.office.com/OLS/MySoftware.aspx>.

If you don't see Office listed, your plan probably doesn't include Office applications. If you know your plan includes Office, you may not have a license assigned, see What Office 365 product or license do I have? If Office is not listed ask your Office 365 administrator to assign a license to you.

On the **Office** page, go to the version of Office you want to install. For example, your admin may have given you the option to install Office 2016 or Office 2013.

## Office

Install Office 365 ProPlus with the new 2016 apps (Recommended)

This will install the following apps on your computer: Word, Excel, PowerPoint, OneNote, Access, Publi



Word



Excel



PowerPoint



OneNote



Access



Publisher



Outlook

Language:

English (United States)

Version:

32-bit (Recommended) [Advanced](#)

Don't see the language you want? Install one of the languages in the list above and then install a language pack.

[Review system requirements](#)

[Troubleshoot installation](#)

▲ Install Office 365 ProPlus with the 2013 apps

[Why would I install Office 2013?](#)

This will install the following apps on your computer: Word, Excel, PowerPoint, OneNote, Access, Publi

Language:

English (United States)

Version:

32-bit (Recommended) [Advanced](#)

**Note:** Installing additional languages on a computer that already has this version of Office doesn't count toward the license limit.

[Review system requirements](#)

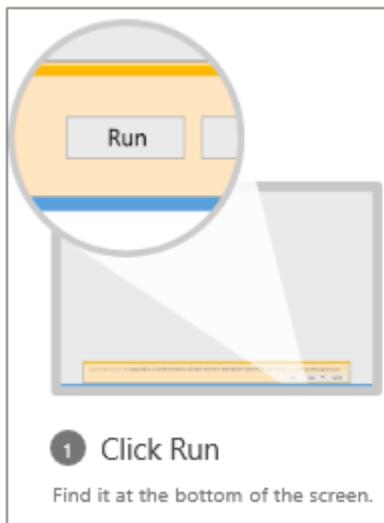
[Troubleshoot installation](#)

Select a **Language**, and then choose **Install** to install the 32-bit version.

**NOTE:** To install the 64-bit version, choose 64-bit in the **Version** section before you choose **Install**. If you're uncertain, try [Choose the 32-bit or 64-bit version of Office](#) for more information.

Depending on your browser, go to the install pop-up that appears and click **Run** (in Internet Explorer) **Setup** (in Chrome), or **Save File** (in Firefox).

Internet Explorer



- 1 Click Run

Find it at the bottom of the screen.

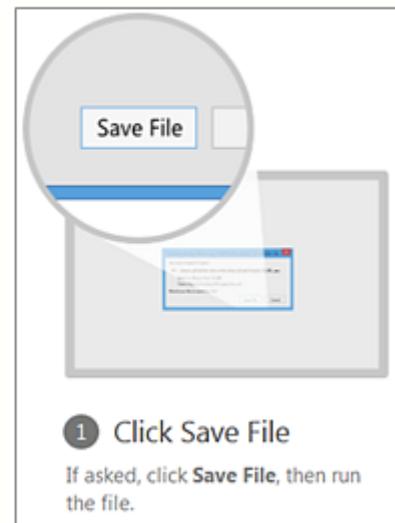
Chrome



- 1 Click setup

Click the **Setup** file at the bottom of the screen.

Firefox

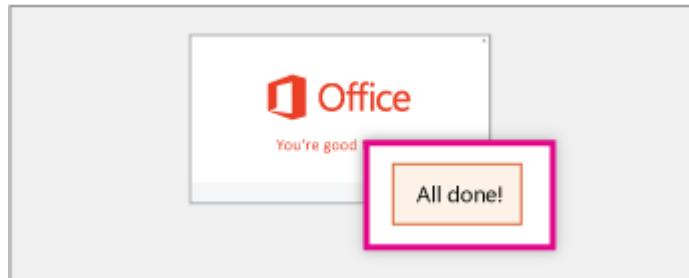


- 1 Click Save File

If asked, click **Save File**, then run the file.

Follow the prompts and accept the license agreement.

When you see "You're good to go," select **All done**.



**TIP:** After installing, you can start to use Word, Excel, and the other Office applications. If you can't find the applications, learn how to find the Office applications that you just installed.

#### Next step

Now that you're done installing Office, set up your email in Outlook.

#### *Appendix 86: Microsoft Office 365 Business Premium – Deployment to Clients*

Managing Office 365 Deployment via Group Policy (GPO)

Recipes, SCCM 2012

By Willem-Jan Vroom

Last updated: 27th June, 2015, 10:10 PM

It is possible to manage an Office 365 deployment via GPO. So you can make sure that all the users are using the same version. Also you can ask certain people to test a newer version. If the new version gives issues, you can easily revert back to the previous version.

In this article I will show you how this is done.

Download the Office Deployment Tool and deploy O365 via SCCM

1. Download the Office Deployment Tool for Click-to-Run. Extract the file.

2. Create this download xml to download the installation sources:

[download.xml](#)

[raw download](#)

```
1 <Configuration>
2   <Add SourcePath="\\demo-sccm\SCCMPackages\All Applications\MS O365 15.0.4535.1004 ENG" Version=
3     OfficeClientEdition="32" >
4       <Product ID="O365ProPlusRetail">
5         <Language ID="en-us" />
6       </Product>
7     </Add>
8   <Updates Enabled="FALSE" />
9   <Display Level="None" AcceptEULA="TRUE" />
10  <Logging Path="%temp%" />
11  <Property Name="AUTOACTIVATE" Value="1" />
12  </Configuration>
```

3. To download run the command:

[download.cmd](#)

[raw download](#)

```
1 "%~dp0setup.exe" /download "%~dp0download.xml"
```

4. Create this deploy xml to deploy the downloaded Office 365 installation files:

[deploy.xml](#)

[raw download](#)

```
1 <Configuration>
```

```

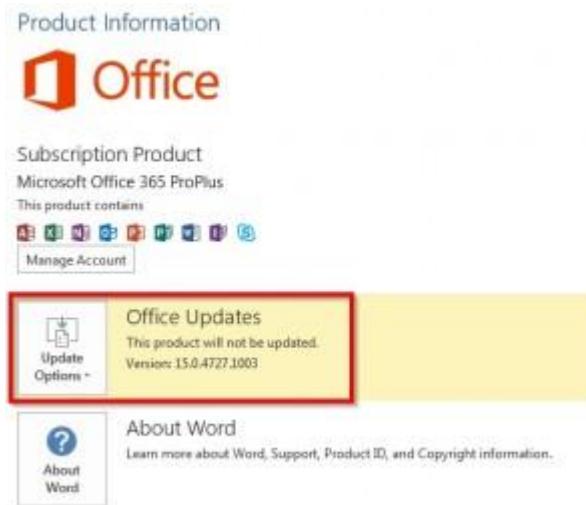
2   <Add OfficeClientEdition="32" >
3
4     <Product ID="O365ProPlusRetail">
5       <Language ID="en-us" />
6     </Product>
7   </Add>
8
9   <Updates Enabled="FALSE" />
10
11  <Display Level="None" AcceptEULA="TRUE" />
12
13  <Logging Path="c:\windows\system32\logfiles" />
14
15  <Property Name="AUTOACTIVATE" Value="1" />
16
17  <Property Name="FORCEAPPSHUTDOWN" Value="TRUE" />
18
19  </Configuration>

```

5. In this case the application is deployed via SCCM 2012 task sequence with the command:

```
1 setup.exe /configure deploy.xml
```

6. If Office 365 is deployed to a computer, and Word will be opened, then it is visible as follows:



After installing the version is used as mentioned in the deployment xml.

Create the policy

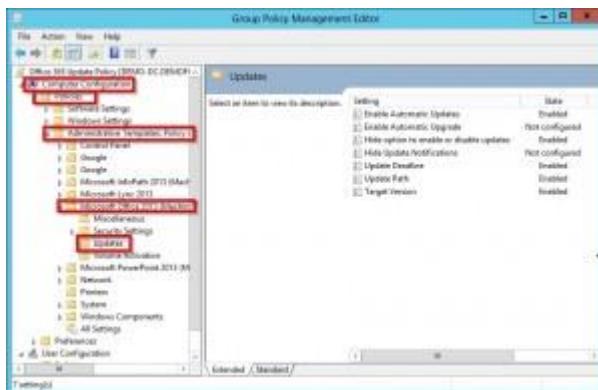
1. Download and extract the [Office 2013 Administrative Template files \(ADMX/ADML\) and Office Customization Tool](#).
2. Created the policy. I used WMI filtering to make sure that the policy is only applied to the machines where Office 365 has been installed.

1      **SELECT \* FROM win32\_Directory WHERE name="c:\\Program Files\\Microsoft Office 15\\root\\office15"**



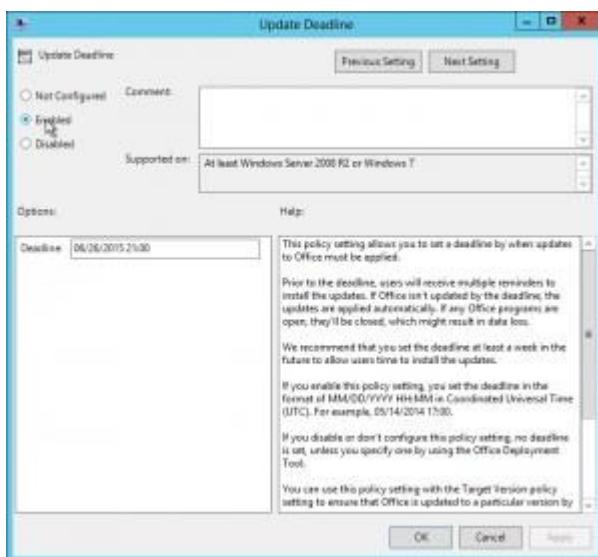
3.

4. WMI Filter to make sure that this policy is only applied to machines with Office 365 installed.
5. The policy as it has been created:



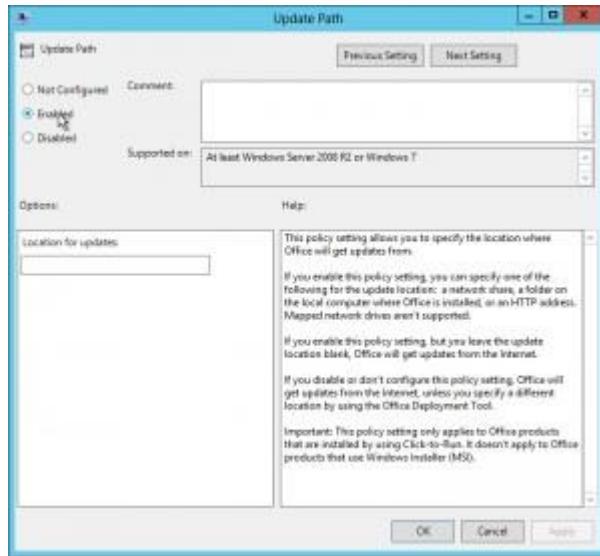
The policy path.

6. The installation deadline. It is in the format MM/DD/YYYY TT:TT where TT:TT is the UTC time.



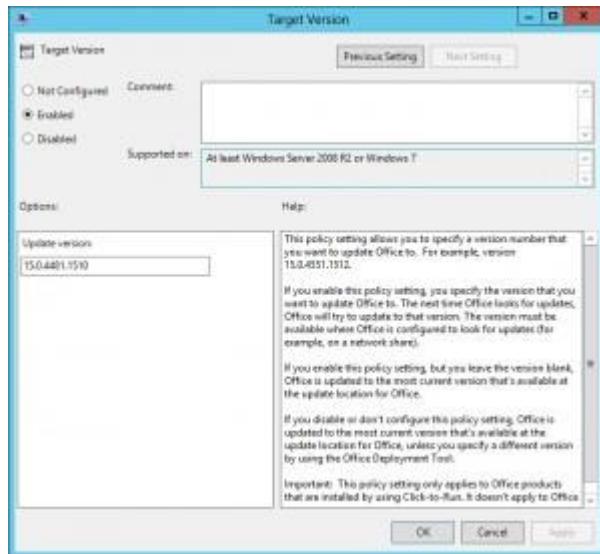
The installation deadline.

7. The update path. If the update path is empty, then the sources will be downloaded from the internet.



An empty update path thus the installation files will be downloaded from the internet.

8. The target version. You can enter whatever version, even a downgrade is possible. You can find all the version numbers on [Update Office 2013 or Office 365](#).



The target version.

9. On a computer with Office 365 installed, the policy is applied:

```

Administrator: Command Prompt
Windows data for DEMO-CLT8PM\adm_william on DEMO-CLT8PM - Logging Mode

OS Configuration: Windows Workstation
OS Version: 6.1.7601
Site Name: Default-First-Site-Name
Group Policy Objects: None
Local Profiles: C:\Users\adm_william
Connected over a slow link?: No

COMPUTER SETTINGS
Computer Name: DEMO-CLT8PM\adm_william
Last time Group Policy was applied: 6/27/2015 at 1:23:57 PM
Group Policy was applied from: DEMO-DC.demoforest.local
Group Policy slow link threshold: 500 kbps
Domain Name: DEMOFOREST
Domain Type: Windows 2000

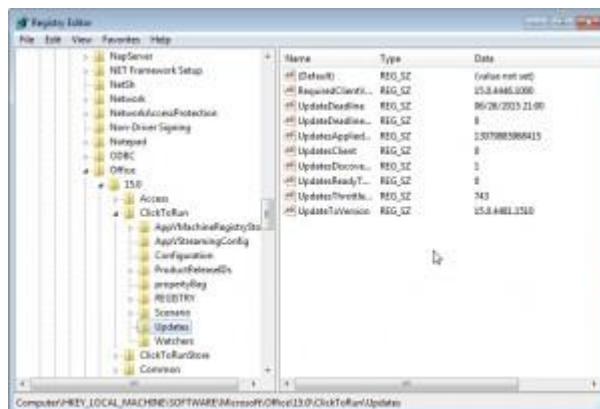
Applied Group Policy Objects
Office 365 Update Policy
Default Domain Policy
Local Group Policy

The following GPOs were not applied because they were filtered out
WBEM - SCOM
Filtering: Disabled (GPO)
None drives and Profile
Filtering: Disabled (GPO)

```

The policy has been applied successfully.

10. You can verify it with regedit:



Use regedit to verify the settings.

11. Now Office updates are enabled:

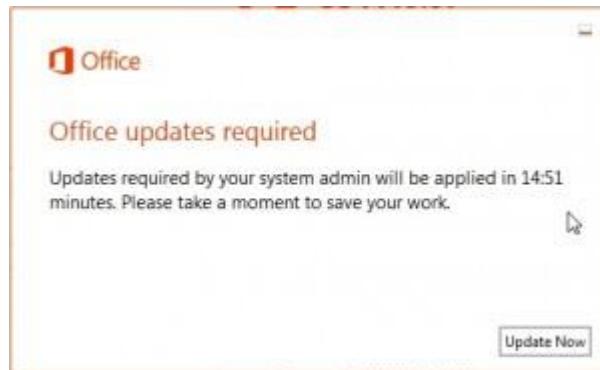
### Product Information

**Subscription Product**  
Microsoft Office 365 ProPlus  
This product contains:

**Office Updates**  
Updates are automatically downloaded and installed.  
Version: 15.0.4727.1003

Policy has been enabled.

12. After a while you will be notified that there are updates. You have 15 minutes time to install them:



A message stating that Office updates are required.

13. The updates are applied. In this case a **downgrade**.



Office applications are closed. The closed applications will be opened after the update.

#### Product Information



Subscription Product

Microsoft Office 365 ProPlus

This product contains



[Manage Account](#)

#### Office Updates

Updates are automatically downloaded and installed.

Version: 15.0.4418.1510



The downgrade from version 15.0.4535.1004 to 15.0.4418.1510.

## *Appendix 87: Microsoft Office 365 Business Premium - System Requirements*

### Computer and processor

PC: 1 gigahertz (GHz) or faster x86-bit or x64-bit processor with SSE2 instruction set

Mac: Intel processor

### Memory

PC: 2 GB RAM

Mac: 4 GB RAM

### Hard disk

PC: 3.0 GB of available disk space

Mac: 6 GB of available disk space. HFS+ hard disk format (also known as Mac OS Extended or HFS Plus)

### Display

PC: 1280 x 800 screen resolution

Mac: 1280 x 800 screen resolution

### Graphics

PC: Graphics hardware acceleration requires a DirectX 10 graphics card.

### Operating system

PC: Windows 10, Windows 8, Windows 7 Service Pack 1, Windows 10 Server, Windows Server 2012 R2, Windows Server 2012, or Windows Server 2008 R2

Mac: Mac OS X 10.10

For the best experience, use the latest version of any operating system.

### Browser

The current or immediately previous version of Internet Explorer; the current version of Microsoft Edge, Safari, Chrome, or Firefox. [Get more details.](#)

### .NET version

PC: .NET 3.5 required. Some features may require .NET 4.0, 4.5, or 4.6 CLR to also be installed.

### Other

Internet functionality requires an Internet connection. Fees may apply.

A touch-enabled device is required to use any multi-touch functionality. But, all features and functionality are always available by using a keyboard, mouse, or other standard or accessible input device. Note that touch features are optimized for use with Windows 10, Windows 8.1 or Windows 8.

Product functionality and graphics may vary based on your system configuration. Some features may require additional or advanced hardware or server connectivity.

A Microsoft account and/or Microsoft organizational account

Client applications

Make sure that:

Your Office clients are compatible with Office 365. Office 365 works with any version of Office in mainstream support: the latest version of Office, Office 2013, and Office 2011 for Mac. Previous versions of Office clients, such as Office 2010 and Office 2007, may work with Office 365 with reduced functionality. [Get more details on mainstream support and Office versions.](#)

You're in compliance with the Microsoft [Service Pack Support Lifecycle Policy](#). Staying on a fully supported service pack for your Office version ensures that you're on the latest and most secure version.

Office 365 ProPlus and Lync Basic users can defer installing updates for only 12 months from date of release.

Hardware: The Office 365 ProPlus requirements are the same as the [Office Professional Plus 2016 requirements](#).

Some features in Project Online require connectivity to Project Pro for Office 365, Project Professional 2016, or Project Professional 2013.

Feature differences in subscriptions

For more information about Office 365 features, see the [Office Applications Service Description](#) or, if you have Office 365 operated by 21Vianet in China, see this service description

#### *Appendix 88: Microsoft Office for Business Premium – Purchasing*

The image is a composite of two parts. On the left, there is a screenshot of a website page for 'Office 365 Business Premium'. The page has a dark header with the text 'Office 365 Business Premium' in white. Below the header, there is a sub-header: 'Increase your impact and expand your reach with Office powered by the cloud—must-have tools for business today.' followed by a bold statement: 'Office 365 Business Premium now includes the new Office 2016 apps for your PC and Mac.' There are two pricing options listed: one for an 'annual commitment' at £7.80 per user/month, and another for a 'monthly commitment' at £9.40 per user/month. Both options include a green 'Buy now' button. At the bottom of the page, there is a note: 'Price does not include VAT.' and a link for a 'Free trial'. On the right side of the image, there is a photograph of a man with a beard, wearing a grey cardigan over a white shirt, sitting at a desk in an office environment. He is looking slightly to his right with his hands clasped together.

## Video Conferencing – Appendices

Information relating to Skype and other video conferencing information:

### *Appendix 89: Skype for Business Premium – Installation Appendix*

Install Skype for Business on your PC

---

APPLIES TO: Office 365 , Office 365 Admin , Office 365 Small Business Admin , [More...](#)

#### Which version do I have?

Skype for Business is part of the Office 365 suite of products. [What's Skype for Business?](#)

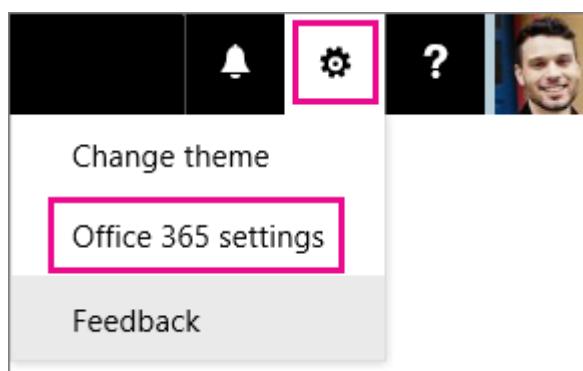
You get the Skype for Business download from the Office 365 portal, and then install it on your computer. These steps usually take 10-15 minutes to do. Choose from the instructions below.

#### Install Skype for Business with Office 365

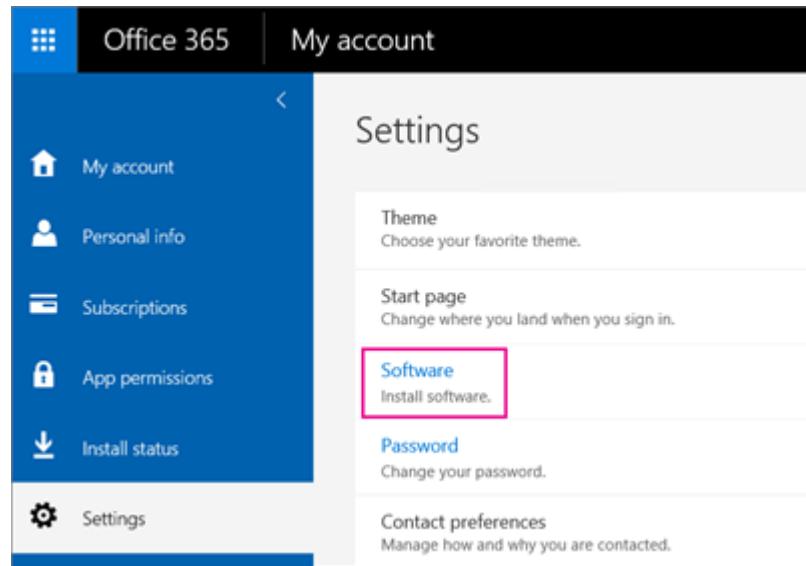
These instructions explain how to get to the Skype for Business download, and install it.

**TIP:** If you don't see the Skype for Business download in your portal, make sure the [Office 365 for business plan](#) you purchased includes it. Also, ask the person in your business who purchased it whether they assigned a license to you.

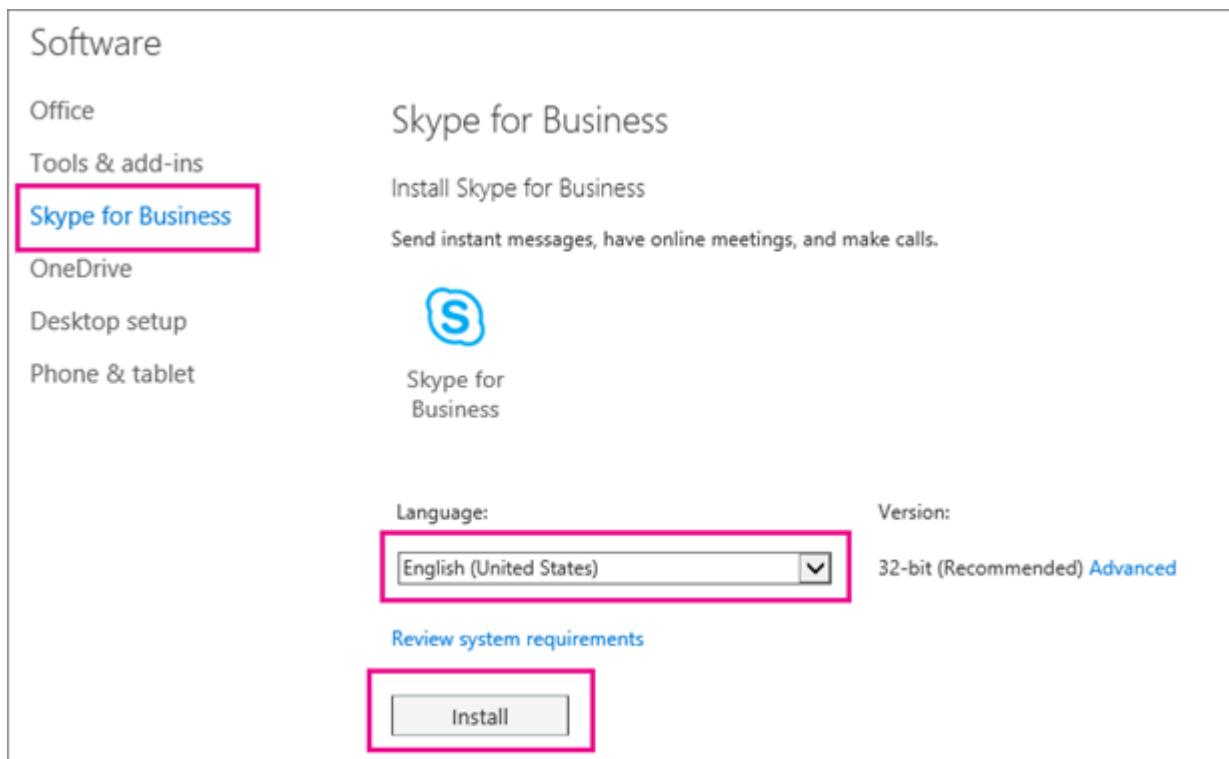
- .. Sign in to Office 365 at <https://portal.office.com/>.
2. At the top of your Office 365 page, choose  > **Office 365 settings**.



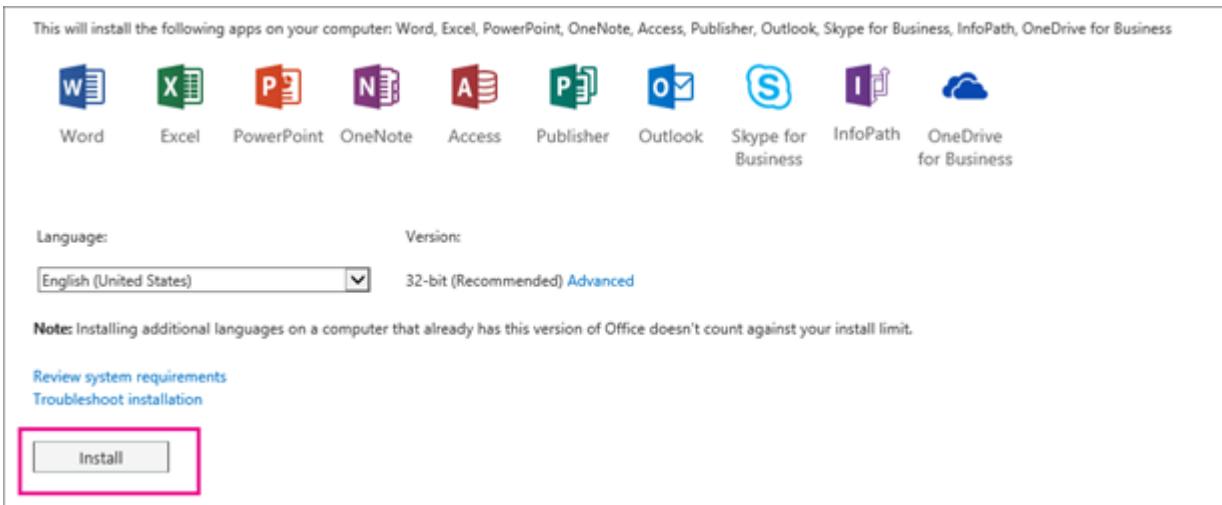
3. Choose **Software**.



- 4. Depending on your Office 365 plan:
- If you see the following page, choose **Skype for Business**, choose your language, the edition that matches your other Office applications (**32 bit or 64 bit** - if you don't know, choose the default) and choose **Install**. Then **go to step 5**.



- If Skype for Business is bundled with other Office 365 applications, you'll see the following page. Choose **Install** to install the Office 365 suite of applications, including Skype for Business. When you're done, go to **Sign in for the first time** at the end of these steps.



- If you don't see Skype for Business listed at all, then it's not included in your [Office 365 business plan](#) or your admin hasn't assigned a license to you.
- At the bottom of your screen, choose **Save as** to download the **setupskypeforbusinessentryretail.exe** file to your computer.



- IMPORTANT:** Note where you saved the **setupskypeforbusinessentryretail.exe** file on your computer. If Skype for Business stops during setup, this is where you go to re-run it.
- After the **setupskypeforbusinessentryretail.exe** file has downloaded, choose **Run**.



The Office installer starts, and displays a message that it's installing Office. **However, it's only installing Skype for Business. It is not installing all of Office.**



7. When the Office installer is finished, it displays a message that Office was installed on your computer. However, only Skype for Business was installed. Choose **Close**.

8. Launch Skype for Business. At the First things first box, if you accept the licensing agreement, choose **Accept**.

You can install Skype for Business on up to 5 PCs. To install Skype for Business on another PC:

1. Log on to your next PC.

2. Sign in to Office 365 at <https://portal.office.com/>.

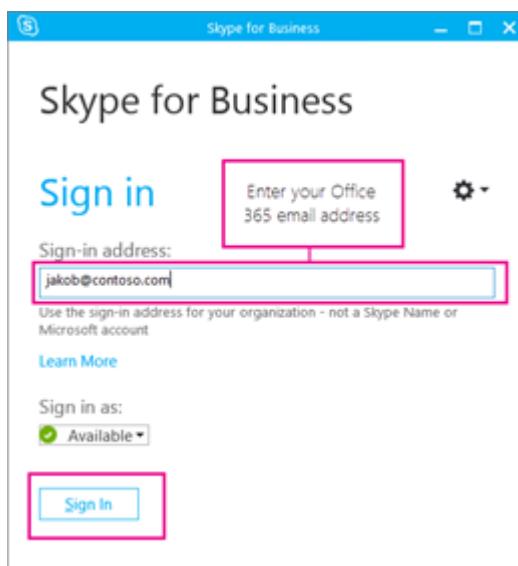
3. Repeat the steps listed in the above procedure to download and install Skype for Business.

Congratulations! You're done installing Skype for Business. Now you're ready to sign in to Skype for Business for the first time.

### Sign in for the first time

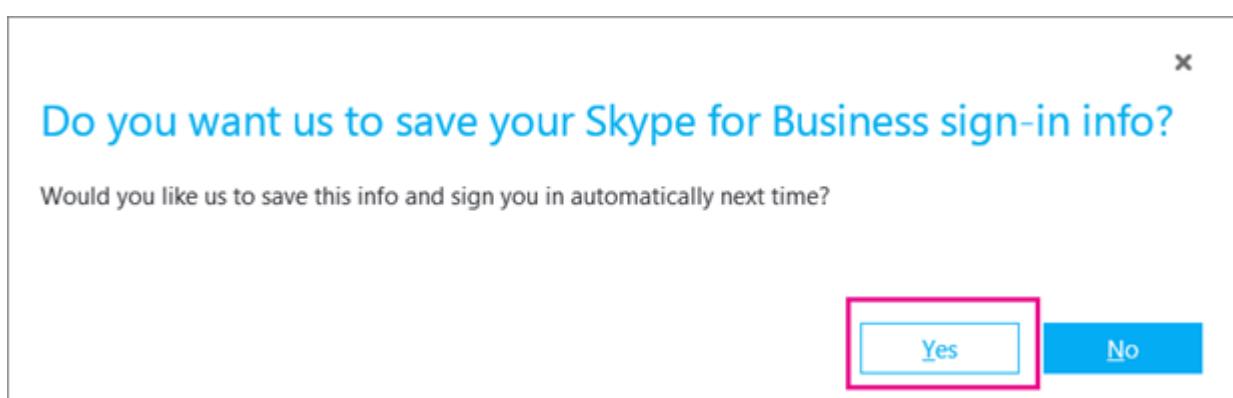
At the Skype for Business sign in page, enter your Office 365 user ID and password, and then choose **Sign in**.

For example, if you use jakob@contoso.com to sign in to Office 365, that's what you'll enter to sign in to Skype for Business.



2. Enter your password for Office 365.

3. At the next page, if you want to save your password for signing in next time, choose **Yes**.



- At the **Help Make Skype for Business Better** box, choose whether to allow us to collect error logs and device configuration info.

Congratulations! Now you're ready to [get started using Skype for Business for IM and online meetings](#).

## *Appendix 90: Skype for Business Premium – Deployment Appendix*

### Step 1 – Download the Office Deployment Tool for Click-to-Run

At the time of writing the Office Deployment Tool can be downloaded from <https://www.microsoft.com/en-gb/download/details.aspx?id=36778> Once downloaded setup a file share that domain users (or any other users that will be installing Skype for Business) has read access to and extract the files into this share.

I'm going to use \Server01\Everyone\Software\deploy

### Step 2 – Configure the Office Deployment Tool for Click-to-Run

Once the files are in your share you should have a setup.exe file and a configuration.xml file that Microsoft kindly supplies and a template. There are an array of options you can put into this XML file however I'm just going to cover the ones we are going to be using. More info can be found here for other configurations <https://technet.microsoft.com/en-us/library/jj219426.aspx>. Our configuration file will look something like this.

```
<Configuration>
<Add SourcePath="\server01\Company\Everyone\Software\deploy\office" OfficeClientEdition="32" >
<Product ID="LyncRetail">
<Language ID="en-us" />
</Product>
</Add>
<Updates Enabled="TRUE" />
<Display Level="None" AcceptEULA="TRUE" />
<Logging Path="%temp%" />
<Property Name="AUTOACTIVATE" Value="1" />
</Configuration>
```

Firstly in this config file we are specifying the SourcePath of our installation files that we are about to download. I'd recommend creating a new folder within your share. For this example the folder is called 'office'. The clients installing Skype for Business MUST have access to this folder.

We then specify 'OfficeClientEdition'. In most cases it's still best practice to use 32-bit edition of Office applications so we'll stick with that. Next we choose the products we'd like to install, notice Microsoft is still using the Product ID for LyncRetail for Skype for Business. You can also add as many languages here as you require. Simply add a new line.

The next lines should be pretty self-explanatory, as before more values can be found at. <https://technet.microsoft.com/en-us/library/jj219426.aspx>

### Step 3 – Download Skype for Business installation files

With the XML file saved, our configuration is ready and we can download the Skype for Business installation files, be warned the download is around 1GB so make sure you've got the disk space! – and if you don't you've got bigger problems!

Open a new cmd window, we're going to run it on the server, and type.

```
\Server01\Everyone\Software\deploy\setup.exe /download \\Server01\Everyone\Software\deploy\configuration.xml
```

We're simply running the setup.exe and providing the XML configuration to the setup. The process may take some time depending on your internet connection, you'll know it's finished when the command prompt window becomes active again.

### Step 4 – Install Client Software / Prepare Group Policy

We are now ready to install the software on client desktops. It's worth noting that you could now do this manually by running this command on every machine.

```
\Server01\Everyone\Software\deploy\setup.exe /configure \\Server01\Everyone\Software\deploy\configuration.xml
```

Note it's the same command as before but with a configure switch instead of a download switch. This will install the software on the desktop without using an internet connection to download Skype for Business, it will all be taken from the network share.

However we're looking to run this script automatically via group policy. Create a new .cmd file inside the same network share we've been using and copy this script below into the file and save. Note you need to set the values "Deploy Server", "ConfigFile" and "LogLocation". Where "DeployServer" is the location of the downloaded source files, "ConfigFile" is the location of the configuration.xml file, and "LogLocation" is the location of where you want any logs stored. We saved the file with the name \_InstallOfficeGPO.cmd

```
setlocal
```

```
IF EXIST "C:\Program Files\Microsoft Office 15\root\office15\lync.exe" (goto End) else (goto Install)
```

```
:Install
```

```
REM Set DeployServer
```

```
set DeployServer=\\server01\Company\Everyone\Software\deploy
```

```
REM Set ConfigFile
```

```
set ConfigFile=\\server01\Company\Everyone\Software\deploy\configuration.xml
```

```
REM Set LogLocation
```

```
set LogLocation=\\server01\Company\Everyone\Software\deploy\logs
```

```
REM Start Install
```

```
echo %date% %time% Setup started. >> %LogLocation%\%computername%.txt  
start /wait %DeployServer%\setup.exe /configure %ConfigFile%  
echo %date% %time% Setup ended with error code %errorlevel%. >> %LogLocation%\%computername%.txt
```

```
:End
```

```
Endlocal
```

This script needs to be run on computer startup, it essentially checks if Skype for Business is already installed, if not, we install Skype for Business. Simple.

The group policy rule we need to include can be set under Computer Configuration > Windows Settings > Scripts > Startup. Here we can add the script that needs to run at startup. Note it's important to point to the Share where the script is stored, not a local drive, otherwise the client machines won't be able to reach it. For example we need to point to \\Server01\Everyone\Software\deploy\_InstallOfficeGPO.cmd

Congratulations, Skype for business will now be automatically deployed to all machines within that group policy scope. You can test if this worked by running

```
gpupdate /force
```

and restarting. You should see Microsoft Click to Run process in Task Manager during the install.

### *Appendix 91: Skype for Business Premium – System Requirements*

#### **Skype for Windows Desktop**

Version	Windows 10 Windows 8.1 Windows 8 Windows 7 (32-bit and 64 bit versions supported)* Windows Vista Windows XP SP3 (32-bit version only)◆
Processor	At least 1 GHz
RAM	At least 512 MB
Additional software	DirectX v9.0 or above

## Appendix 92: Skype for Business – Purchasing



### Online meetings with Skype

#### Skype

Free Skype audio and video calls, and messaging

Get Skype for free

[Check out Skype](#)

#### Skype for Business

Professional meetings and collaboration—all integrated with your Office apps

From £1.30 user/month

[Check out Skype for Business](#)

## Business Suite - Appendices

Information relating to Pegasus Opera 3:

### *Appendix 93: Pegasus Opera 3 – Financials Business Accounting Software Appendix*

#### **Nominal Ledger**

<b>Flexible Chart of Accounts</b>	Account, Type, Sub Type, Cost Centre, Department and Project
<b>Financial Calendar</b>	Define up to 24 periods
<b>Rebuild Periods</b>	Allows period balances to be re-calculated if the Financial Calendar is adjusted during the fiscal year
<b>Dimensional Analysis</b>	Cost Centre, Department* and Project* analysis
<b>Group Analysis</b>	Group together Nominal accounts for additional reporting and analysis
<b>Journals</b>	Reversing, Recurring, Retained (Skeleton) and VAT journals
<b>Open Period Accounting</b>	Transactions can be easily posted from other applications such as Sales, Purchase, Cashbook, and Payroll into any open period of the current or next 3 financial years. Nominal Journals can be raised to the previous year.
<b>Budgeting</b>	Budgeting at Account, Cost Centre, Department and Project level with import facilities from Microsoft Excel using Pegasus XRL
<b>Private Nominal Accounts</b>	Account details can be restricted to users who have had additional security applied
<b>Real-time or Batch Update</b>	Update Nominal accounts in real time or batch update from source ledgers
<b>Distribution Accounts</b>	Transactions posted to distribution accounts are automatically distributed to cost centres based on defined percentages
<b>Multi-Currency</b>	Nominal accounts can hold both base and currency period to date, year to date and previous year values
<b>Revaluation</b>	Currency bank balances can be re-valued at any time based on current exchange rates

<b>Transaction History</b>	Retain transactions and journal images for up to nine years
<b>User Definable Views*</b>	Define financial management Views with up to six levels of analysis, apply criteria filtering and graphical representation. Report across fiscal years and periods with transactional drilldown and easy export facilities to Microsoft Excel
<b>Transactional Drilldown</b>	Drilldown through user definable Views or Nominal accounts to period values, transactions and source documents
<b>Financial Reporting</b>	An extensive range of reports are provided as standard including the ability to define your own management reports (Profit & Loss and Balance Sheet)
<b>Consolidation</b>	Multi-company account consolidation providing group reporting facilities with the ability to consolidate ledgers with different operating currencies
<b>Excel Integration</b>	Information can easily be extracted from Opera 3 into Microsoft Excel with Pegasus XRL
<b>Customisable</b>	The Nominal Ledger can be customised to suit the specific requirements of your business
<b>Context sensitive Help</b>	Comprehensive and easy to use Help facilities

## Cashbook

<b>Receipts and Payments</b>	Can be processed in the Cashbook, Sales or Purchase Ledgers
<b>Batch Processing</b>	Batches of Receipts or Payments can be posted together in a single transaction
<b>Cashbook Types</b>	Allows the creation of multiple Cashbook types for Receipts, Payments and Transfers to match how transactions will appear on bank statements
<b>Recurring Entries</b>	Set-up direct debit and standing order entries on a monthly, quarterly or user definable basis
<b>Bank Reconciliation</b>	Includes transactional drilldown, ledger postings, the ability to save a partially completed bank reconciliation and the ability to produce the bank reconciliation listing as per the bank statement

<b>Bank Transfers</b>	Transfer funds from one account to another
<b>BACS and e-Banking</b>	Allows payments to be processed via BACS and banking software
<b>Multi-Currency</b>	Create home and currency bank accounts
<b>Petty Cash</b>	Create any number of Petty Cash accounts
<b>Cheque &amp; Remittance Advice</b>	Allows combined cheque and remittance advice production, to suit your company stationery
<b>Matching</b>	Easily match and remove any incorrectly posted transactions which will never appear on the Bank Statement
<b>Opening Balances</b>	Individual account set-up is simplified with the Opening Balances routine
<b>Transaction History</b>	Reconciled transactions can be retained for up to 99 periods
<b>Comprehensive Reporting</b>	An extensive range of reports are provided as standard
<b>Account View</b>	Provides reconciled and un-reconciled information, statement number and date range selection, transaction detail, statement line number and paying in slip reference
<b>Excel Integration</b>	Information can easily be extracted from Opera 3 into Microsoft Excel with Pegasus XRL
<b>Customisable</b>	The Cashbook can be customised to suit the specific requirements of your business
<b>Context Sensitive Help</b>	Comprehensive and easy to use Help facilities

## Sales Ledger

<b>Trade in Multiple Currencies</b>	Process transactions in any currency, with values recorded in the base and customers operating currency
<b>Delivery and Head Office</b>	Unlimited delivery accounts with the ability to re-direct invoices and statements to Head Office
<b>Trading Terms</b>	Define trading terms for an individual or a range of customers (eg payment terms, settlement discount and credit limit)

<b>Credit Control</b>	Includes statement production, debtor letters, provision for bad debts, customer debtor days, statistical debtor analysis, customer notes and the ability to place customer accounts on stop
<b>E-mail Integration</b>	Produce customer e-mails, statements and copy invoices, automatically generating a customer note for audit and reporting purposes
<b>Multiple Contacts</b>	Unlimited contacts and the ability to apply up to six attributes against each contact, ideal for marketing campaigns and targeted mailings
<b>Disputed Invoice Analysis</b>	Assign user definable reason codes against disputed invoices, with reporting facilities to highlight any trends and automatic customer note generation
<b>Statistical Debtor Analysis</b>	Includes average debtor days, turnover and Sales analysis for up to 99 periods
<b>Customer Notes</b>	Assign notes to customer records as a reminder or a task for others, with full e-mail integration
<b>Dormant Accounts</b>	Exclude any dormant accounts from Sales processing, searches and reports
<b>Transaction History</b>	Retain transactions for up to 99 periods
<b>Attachments</b>	Attach multiple files (eg spreadsheet, Word document) to a customer account
<b>User Definable Views</b>	Define Sales Views with up to six levels of analysis, apply criteria filtering and graphical representation. Report across Sales periods with full transactional drilldown and easy export facilities to Microsoft Excel or Word
<b>Transactional Drilldown</b>	Drilldown through user definable Views or sales accounts to transactions and source documents
<b>Comprehensive Reporting</b>	An extensive range of reports are provided as standard
<b>Excel Integration</b>	Information can easily be extracted from Opera 3 into Microsoft Excel with Pegasus XRL
<b>Customisable</b>	The Sales Ledger can be customised to suit the specific requirements of your business
<b>Context Sensitive Help</b>	Comprehensive and easy to use Help facilities

## Purchase Ledger

<b>Trade in Multiple Currencies</b>	Process transactions in any currency with values recorded in both the base and suppliers operating currency
<b>Ledger Account</b>	Specify an alternative ledger account to receive payments for this supplier eg a factoring house
<b>Trading Terms</b>	Define individual terms or profiles to attach to supplier accounts, including settlement discount rates and supplier payment terms
<b>Suggested and Automatic Payments</b>	Methodical payment routines that allow the progression of payments for suppliers from suggested payments to authorisation and through to generation of cheque and BACS payments
<b>Cheque &amp; Remittance Advice</b>	Flexible design allows the generation of a combined or individual cheque and remittance advice, to suit your company stationery
<b>E-mail Integration</b>	Send an email directly from the supplier account using contact information. This will automatically generate a supplier note for audit and reporting purposes
<b>Purchase Invoice Register (PIR)</b>	Use PIR to record Purchase Invoices and Credit Notes. Once authorised the transactions can then be posted to the Purchase Ledger to update the accounts and the Purchase analysis files
<b>Held Invoice Analysis</b>	Assign user definable reason codes against disputed Invoices, with reporting facilities to highlight any trends and automatic supplier note generation
<b>Multiple Contacts</b>	Unlimited contacts and the ability to apply up to six attributes against each contact
<b>Dormant Accounts</b>	Exclude any dormant accounts from Purchase processing, searches and reports
<b>Attachments</b>	Attach multiple files (eg spreadsheet, Word document) to a supplier account
<b>Transaction History</b>	Retain transactions for up to 99 periods

<b>User Definable Views</b>	Define Purchase Views with up to six levels of analysis, apply criteria filtering and graphical representation. Report across periods with full transactional drilldown and easy export facilities to Microsoft Excel or Word
<b>Transactional Drilldown</b>	Drilldown through user definable Views or Purchase accounts to transactions and analysis
<b>Comprehensive Reporting</b>	An extensive range of reports are provided as standard
<b>Excel Integration</b>	Information can easily be extracted from Opera 3 into Microsoft Excel with Pegasus XRL
<b>Customisable</b>	The Purchase Ledger can be customised to suit the specific requirements of your business
<b>Context Sensitive Help</b>	Comprehensive and easy to use Help facilities

## Costing

<b>Contracts, Jobs and Phases</b>	This flexible structure provides extensive control, monitoring and reporting of Contracts, Jobs and Phases
<b>Estimates</b>	Full Estimate processing with budget forecast and Quote production facility. A Job can be created from an Estimate without the need to re-key the information and an Estimate can be used more than once
<b>Cost Types</b>	Use an extensive range of Cost and Revenue cost types including: Direct and Recharge Expense, Labour, Contractor, Stock, Retention, Interim & Final Billing, Overhead and Retention
<b>Cost Code Analysis</b>	Create unlimited Cost Codes, linked to Cost Types, to give unlimited analysis of cost and revenue transactions, overheads and budget comparison
<b>Cost Rates</b>	Allows up to 999 Cost Rates to be used at Contract or Job level. If a change of rate is required this can be applied at transaction level, applying the appropriate cost from the Cost Code
<b>Budgets</b>	Actual and revised budgeting facilities
<b>Revenue</b>	Revenue postings created in Costing can generate detailed Documents in Invoicing or SOP. Choose to Invoice by individual Cost lines, Frameworks, Cost Types or a direct value

<b>Integration</b>	Real-time integration with Opera 3 Financials, Supply Chain Management and Payroll & HR means transactions are only required to be processed once
<b>Batch Processing</b>	Use Batch Processing to enter batches of Timesheets or Costs for a range of Jobs in one efficient process
<b>Payroll Transfer</b>	Employee Timesheets processed in Costing can easily be transferred to Payroll, saving the need to re-enter the information
<b>Frameworks</b>	Group associated Cost Codes and apply to Jobs and Estimates to simplify the budget process
<b>Department Analysis</b>	Add further analysis by introducing an optional Department code against Jobs and Estimates
<b>Transactional Drilldown</b>	Detailed, multi-level transactional drilldown at Contract and Job level
<b>User Definable Views</b>	Define Costing Views with up to six levels of analysis, apply criteria filtering and graphical representation. Report across periods with full transactional drilldown and easy export facilities to Microsoft Excel
<b>Global Cost Codes</b>	Provides the ability to perform a global update of Cost Codes, including the option to increase any overhead values
<b>Comprehensive Reporting</b>	An extensive range of reports are provided as standard
<b>Excel integration</b>	Information can easily be extracted from Opera 3 into Microsoft Excel with Pegasus XRL
<b>Customisable</b>	Costing can be customised to suit the specific requirements of your business
<b>Context Sensitive Help</b>	Comprehensive and easy to use Help facilities

#### *Appendix 94: Pegasus Opera 3 – Supply Chain Appendix*

##### **Stock**

<b>Unlimited Stock Records</b>	Create unlimited records with extended description, sell and cost price, sale and next price, stock category, sales and supply code analysis and links to multiple warehouses
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<b>Multi-Warehouse</b>	Create multiple warehouses. Define movements, cost and sell price, minimum stock and re-order levels for individual stock items
<b>Traceability</b>	Stock items can be serial or batch traceable with traceable history for up to 999 months
<b>Stock Valuation</b>	Value stock by a variety of methods, including FIFO by transaction cost, warehouse last cost and average cost
<b>Receipts &amp; Returns</b>	Goods Received Note and Return to Vendor document processing
<b>Transfers</b>	Transfer stock from one warehouse to another or one to many warehouses, using a distribution table
<b>Profiles</b>	Group stock items together, including stock holding, costing, traceable and issuing information
<b>Integration</b>	Real time or batch update to the Nominal Ledger. Automated and seamless integration to all other Supply Chain Management applications for complete stock management.
<b>Enquiry</b>	Detailed enquiry facilities with criteria selection for specific results. Full transaction drilldown at stock record and warehouse level
<b>User Definable Views</b>	Define stock views with up to 6 levels of analysis with criteria filtering, graphical representation and transaction drilldown. Also includes easy export to Microsoft Excel
<b>Global Price Changes</b>	Perform global changes of cost or sell price for stock items, categories or warehouses, by value or percentage
<b>Attachments</b>	Attach notes, memos, files or images to stock items
<b>Comprehensive Reporting</b>	An extensive range of reports are provided as standard
<b>Customisable</b>	Stock Control can be customised to suit the specific requirements of your business
<b>Context Sensitive Help</b>	Comprehensive and easy to use Help facilities

## Bill of Materials

<b>Multi-level</b>	Create multi-level structures, with unlimited components per level and sub-assembly definition (including phantom)
<b>Work in Progress</b>	Control the progression of Works Orders from creation to completion, including interim stages, allocation, issue and return of components
<b>Automatic Works Order</b>	Generate Works Orders based on warehouse stock re-order levels, or as a result of a back-to-back Sales Order
<b>Works Order Movements</b>	Control the movement of components in relation to assembly structure and build method required
<b>Works Order Progress</b>	Allows batch progression of Works Orders to all Work in Progress stages Includes Works Order detail drilldown and materials list
<b>Kitting</b>	Option to raise and complete a Works Order in one process, resulting in the immediate uplift of stock. Definable per assembly
<b>Modify Structure</b>	The structure of the assembly can be modified per Works Order, to allow for specific customer requirements or component substitution
<b>Traceability</b>	Create batch or serial number traceable assembly structures, including traceability at component level
<b>Integration</b>	Seamless integration with Stock and optional links to SOP and Costing
<b>Assembly Cost Update</b>	Keep build costs up to date in relation to fluctuating component stock prices
<b>Attachments</b>	Attach notes, memos, files or images to assembly records
<b>Enquiry</b>	Detailed enquiry facilities with criteria selection for specific results, including Works Order detail drilldown and materials list.
<b>Comprehensive Reporting</b>	An extensive range of reports are provided as standard
<b>Customisable</b>	Bill of Materials can be customised to suit the specific requirements of your business
<b>Context Sensitive Help</b>	Comprehensive and easy to use Help facilities

## Purchase Order Processing

<b>Document Processing</b>	Create Documents containing products, non-stocked items and description only lines. Supplier discounts are automatically applied where applicable
<b>Order Processing</b>	Create Purchase Orders containing products, non-stocked items and description only lines. Supplier discounts are automatically applied where applicable
<b>Optimise</b>	Individual lines from multiple Documents against one supplier can be optimised together to create one Document
<b>Models</b>	Define template Documents or Orders against supplier records to be used as the basis for a new Document or Order. Quantities may be amended and lines may be added or removed
<b>Re-Order</b>	The re-order function creates Documents or Purchase Orders based on stock or warehouse re-order quantities
<b>Find Document</b>	Search and locate Purchase Documents or Orders from any supplier record
<b>Match</b>	Receipts of goods can be matched to the original Purchase Order quantities. Supplier Invoices can be matched to the Order or the Goods Received Note (GRN)
<b>Satisfy</b>	Manually satisfy Orders that a supplier is unable to fulfil, therefore making them complete.
<b>Supplier Product File</b>	Contains information such as cost price, lead time, economic order quantity and vendor rating, to assist with Order processing and the Re-order functions
<b>Definable Document References</b>	User-defined, self-incrementing Document and Purchase Order references. Option available to allow user input of Purchase Order reference if required
<b>Integration</b>	Seamless integration with Costing, SOP, Stock, PIR and Purchase Ledger
<b>Global Price Changes</b>	Perform global changes of cost prices for supplier products by value or percentage
<b>Comprehensive Reporting</b>	An extensive range of reports are provided as standard
<b>Customisable</b>	POP can be customised to suit the specific requirements of your business

<b>Context Sensitive Help</b>	Comprehensive and easy to use Help facilities
-------------------------------	---

## Invoicing/Sales Order Processing

<b>Document Creation</b>	Caters for Sales Documents, Pro-formas, Quotations, Orders, Deliveries, Invoices and Credit Notes
<b>Document Progression</b>	Progress Documents to the required stage without the need to re-key information. Full edit facilities are also available prior to Invoice.
<b>Discounts</b>	Define line, quantity break and chain discount tables, for an individual or group of customers. Discounts and special prices are automatically applied when processing Sales Documents.
<b>Special Prices</b>	Define special price lists with sale price, next price and quantity breaks, for an individual or group of customers
<b>Batch Processing</b>	Process multiple Documents by account, route or warehouse. An option to consolidate multiple Orders to one Delivery note and Invoice is also available
<b>Repeat Invoice</b>	Process repeat or contract invoices in batches by customer and due date, determined by contract dates and frequency, eg monthly, quarterly, annually, weekly
<b>Part Processing *</b>	Part progress documents on a line by line basis to the required stage, eg customer call-off orders
<b>Model Quotes</b>	Create template Quotes against customer accounts for progression to Orders. Quantities can be changed and lines added or removed if required
<b>Definable Document References</b>	User-defined, self-incrementing Document references. Option available to allow user input of Order, Delivery and Invoice references.
<b>Integration</b>	Seamless integration with Costing, Stock, Sales and Nominal Ledgers
<b>Global Price Changes</b>	Perform global changes of sell, sale or next price for price lists or warehouses by value or percentage
<b>Document Find</b>	Search and locate Sales Documents (Pro-formas, Quotations, Orders, Deliveries, Invoices and Credit Notes) from any customer record

<b>Allocation *</b>	Define stock to Order allocation criteria that best suits your company stock management policy. Pick lists can be produced automatically after allocations have been confirmed
<b>Picking *</b>	Produce picking lists based on allocated stock levels or outstanding Order quantities. Pick lists can be ordered by customer, route, warehouse or bin location
<b>Back to Back *</b>	From SOP, immediately generate Purchase Orders or Documents in POP, and Works Orders in BOM. Alternatively, use back to back processing facilities in POP or BOM to batch process requests
<b>Comprehensive Reporting</b>	An extensive range of reports are provided as standard
<b>Customisable</b>	Invoicing or SOP can be customised to suit the specific requirements of your business
<b>Context Sensitive Help</b>	Comprehensive and easy to use Help facilities

#### *Appendix 95: Pegasus Opera 3 – Business Intelligence Appendix*

**With Opera 3 Business Intelligence tools you get precisely what you need to know without wasting valuable time.**

With Opera 3, you have advanced intelligence working for you. And it's not just us saying that: Pegasus XRL has won awards for its features, while Pegasus Dashboards will revolutionise the way you view the information you need.

<b>Summary</b>	<b>Features</b>
----------------	-----------------

#### **Reporter**

<b>Report Manager</b>	Allows users to easily create their own reports, to supplement those already provided. Select the report basis (table), field order and sequence and define relational and logical operators
<b>Batch Reporting</b>	Allows a batch of reports to be run in a single process
<b>Security</b>	Apply security access to newly created reports
<b>Append to Report Menu</b>	Allows reports to be appended to the associated module report menu
<b>Report Output</b>	Includes output to screen, printer and file. Reports can also be exported in various formats for further data manipulation
<b>E-mail</b>	Allows reports to be e-mailed to remote offices or colleagues

<b>Context Sensitive Help</b>	Comprehensive and easy to use Help facilities
-------------------------------	---

## Pegasus XRL

<b>Seamless Integration with Microsoft Excel</b>	Access XRL features within Microsoft Excel
<b>Summary or Detailed Reports</b>	Reports are easily created using the XRL Report Wizard
<b>Powerful Designer</b>	The XRL Report Designer allows reports to be designed and styled to your exact requirements
<b>Transaction Drilldown</b>	Not only can XRL produce reports rapidly, but it also provides multi-level drilldown to the underlying transactions
<b>Report Library</b>	Keep useful reports in a central repository for immediate access at any time
<b>Dynamic Links</b>	Cells in Excel can be dynamically linked to Opera 3, ensuring the latest information is always displayed
<b>Cube Analysis</b>	Allows data to be manipulated in many ways. Cube analysis allows data to be: <ul style="list-style-type: none"> <li>• Sliced (eg breakdown company turnover by customer)</li> <li>• Diced (see which products customers buy)</li> <li>• Drilled (see details of every invoice for that customer and product)</li> <li>• Charted (provides a concise and clear visual representation of the data)</li> <li>• Distributed (results can be saved as an Excel spreadsheet or in Adobe Acrobat (PDF) format)</li> </ul>
<b>Pivot Table Creation</b>	Simply tick a box to produce an XRL report as an Excel Pivot Table for further data manipulation
<b>Data Send</b>	Allows Nominal Budgets, Price Lists and Stock Adjustments to be easily uploaded from Pegasus XRL to Opera 3
<b>Macro Manager</b>	Allows non-technical users to automate their Excel Workbooks
<b>Security</b>	Access to data is fully controlled by the Opera 3 Security Manager
<b>CRM</b>	XRL reports seamlessly against CRM

<b>Pegasus CIS</b>	In addition to Opera 3, XRL can report against all variants of Pegasus CIS
<b>Operations II</b>	In addition to Opera 3, XRL can also be used with Operations II, our manufacturing solution

### **Pegasus Instant Messenger (PIM)**

<b>Schedule and Distribute Reports</b>	Instruct the system to run specific reports at a scheduled time and day
<b>Configure Reports</b>	Reports are easy to create using simple or advanced wizards.
<b>Report Archive</b>	Easily display a list of reports you (or another user) have received historically using the Message Manager
<b>Instant Messaging</b>	Avoid e-mail spam and clutter by using Instant Messaging to distribute reports. Popups appear on users screens using a colour coded message to announce the priority and availability of new reports
<b>Instant Notes</b>	Record a time and date stamped note for a colleague and use the PIM framework to send it to them
<b>PIM Chat</b>	Use the PIM Instant Messenger framework to contact and collaborate with other users
<b>E-mail Reports</b>	For remote offices or contacts select to distribute reports by e-mail
<b>Widely Available</b>	PIM is available to all users on the network
<b>Operations II</b>	In addition to Opera 3, PIM can also be used with Operations II, our manufacturing solution
<b>Context Sensitive Help</b>	Comprehensive and easy to use Help facilities

### **EC VAT**

<b>Countries</b>	Create Country codes for those countries your company trades with
<b>Transport Modes</b>	Create Transport Mode codes, to be shown on the Supplementary Declaration
<b>Transaction Nature</b>	Create Nature of Transaction (NoTC) codes for reporting purposes
<b>Commodity Codes</b>	Create Commodity Codes to classify goods for reporting purposes

<b>Delivery Terms</b>	Create codes that define the terms of delivery, to be shown on the Supplementary Declaration
<b>ESL Report</b>	The EC Sales List report can generate an XML upload file for transmission to HMRC via their website.
<b>Comprehensive Reports</b>	Comprehensive ESL, SD and VAT reports and audit trail reports are all available
<b>Context Sensitive Help</b>	Comprehensive and easy to use Help facilities

#### *Appendix 96: Pegasus Opera 3 – Payroll & HR Appendix*

- **PAYE Recognition:** Opera 3 Payroll has HMRC PAYE Recognition
- **Multi-Company Processing:** Create one to unlimited companies
- **Multi-Group Processing:** Create up to 36 Payroll Groups per company. Access to Groups may be controlled by password and can have different payment frequencies and unlimited employee records
- **Number of Employees:** Create one to unlimited employee records
- **Employee Profiles:** Streamlines the creation of employee records as it applies employee characteristics that can be assigned to a Group of employees or to an individual employee
- **Payments & Deductions:** Create up to 999 Payments and Deductions
- **SSP, SMP & SPP (Birth) Processing:** Automated, with complex legislation built in
- **NI Adjustments:** Perform retrospective NI adjustments
- **Directors NI:** Calculation based on date of appointment
- **Pay Methods:** Includes a wide range of payment methods including BACS, Cheque and Cash
- **Advanced Pension Management:** Create multiple Pension Schemes, including stakeholder, personal, group personal, COMP or COSR, FAVC and COMB, with full reporting capabilities
- **In-Year Forms:** P45 (1), P45 (3) and P46 reporting and file generation, for submission to HMRC via the Online Filing Manager
- **P11 Reporting:** Automated and designed to replicate the Deductions Working Sheet. Includes detailed and summary option with period range and tax year selection
- **P32 Processing:** Automated and designed to replicate the Employer's Payment Record. Includes monthly or quarterly payment recording, funding, total value drilldown and multiple company consolidation
- **End Of Year Returns:** Generate EOY Return Files for submission via the Online Filing Manager with P60 generation

- **Student Loans:** Automated, with deductions calculated in accordance with the current legislative threshold and percentage amounts
- **Attachments:** Attach multiple files (eg spreadsheet, Word document) to an employee record
- **Holiday Pay:** Process Holiday Pay based on average earnings or an accrued amount
- **Attachment Orders:** Automated, with deductions calculated in accordance with current legislation
- **Payroll History:** Transaction history and payslip images retained for up to 999 pay periods
- **Transfer:** Transfer an employee from one payroll group to another or change the employee reference
- **Override Tax/NI:** Override an Employees Tax/NI system calculation when circumstances dictate
- **Global Holiday:** Provides the facility to place a Group of employees on holiday
- **Employee Picture:** Assign a photograph to an employee record
- **Payroll Analysis:** Analyse payroll values by payroll group, employee, payroll department, Nominal Cost Centre, Department and Project
- **Integration:** Integrates with the Nominal Ledger, Cashbook and Costing with real-time or batch update and transfer
- **User Definable Views:** Define Payroll Views with up to six levels of analysis, apply criteria filtering and graphical representation. Report across pay periods with full transactional drilldown and easy export facilities to Microsoft Excel
- **Historical Employees:** Allows access to historical employee information, including payslip images and the ability to easily re-instate an employee record if required
- **Global Updates:** Perform updates of rates and values across the Payroll, with the option to print pay rise slips and a full audit trail
- **Audit Log:** The audit log records all key field changes made throughout the tax year
- **Comprehensive Reporting:** An extensive range of reports are provided as standard
- **Customisable:** The Payroll can be customised to suit the specific requirements of your business
- **Context Sensitive Help:** Comprehensive and easy to use Help facilities

#### *Appendix 97: Pegasus Opera 3 – Installation Guide Appendix*



Opera 3

Installation Guide



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## Introduction

### About this Guide

This Installation Guide provides information concerning the installation and initial configuration of Opera 3. It also includes guidance for upgrading from Opera II to Opera 3.

The guide assumes you are conversant with networking environments, and have prerequisite knowledge of the supported Microsoft Windows server and desktop editions and other software environment applications identified in this guide.

The guide does not cover the configuration of a network environment.

A separate guide, the System Requirements guide, details the computer hardware and software specifications that are required to install and use Opera 3 and Opera 3 SQL. It also includes guidance on using Opera 3 in a Terminal Services environment.

### Platform Specific Information

Opera 3 is available for both Visual FoxPro and SQL Server database platforms. This guide applies to both database platforms, however, there are certain elements that are only relevant to one or the other database, and as such the relevant sections or paragraphs are clearly identified with the following labels:

[SQL] - only relevant if you are running the application on an SQL Server database [VFP] - only relevant if you are running the application on a Visual FoxPro database.

Sections that are not identified with these labels are relevant to both database types.

Information for specific Windows products is also detailed separately.

### Other Opera 3 Guides and Help

The following user documents are on the Opera 3 CD and in the Opera 3 Client installation's main folder, normally C:\Program Files\Pegasus\O3 Client XXX\User documents (32-bit Windows products) or C:\Program Files (x86)\Pegasus\Client XXX\User Documents (64-bit Windows products) where XXX is either *VFP* or *SQL*.

Some guides are also available on the Opera 3 button menu.

### Readme File

The Readme file contains late breaking news and other release-specific information. You can also view the file from the Opera 3 CD installation menu.

### Release Guide

When new versions of Opera 3 are released, they are normally accompanied by a Release Guide that includes information about what's new in the release. This guide can also be accessed from the Opera 3 CD Installation Menu.

## **Demonstration Data Guide**

This guide is provided to assist in the use of the demonstration data. It is recommended that the Help is used at the same time.

## **Implementation Guide**

The Implementation Guide provides a high-level view of Opera 3 and how to approach an implementation. It details how the modules are integrated, and recommends the order in which elements should be set up.

## **System Requirements Guide**

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**Important:** Check this guide on your Opera CD for the latest supported Windows products.

---

The System Requirements Guide details the recommended hardware and software requirements that are required to install and use Opera 3 and Opera 3 SQL.

It also includes guidance on using Opera 3 and Opera 3 SQL in a Terminal Services or Remote

Desktop Services environment.

## **Opera 3 Help**

Opera 3 Help includes details of the new features in this release of Opera 3 and provides details of all the functions available in the application.

Information	Description
Concept	An 'Introduction to ...' topic that gives an overview of an application, describes the different areas of an application, and includes a chart of how the applications link together.
Reference	These topics describe the different boxes on each form in Opera 3.
Task	These topics describe the steps required to do tasks in Opera 3.
New Features	A 'What's New' Help file provides information on features in a new release, plus other information that is relevant to the release that can be read on-screen.

## **Document Management & Pegasus Dashboards Guides**

Installation Guides are available for both Document Management and Pegasus Dashboards. A user guide is also available for Pegasus Dashboards. Help for Document Management is in the Opera 3 Help. The guides are in the respective folders on the Opera 3 CD and can be accessed from the Opera 3 CD Installation Menu.

## **Feedback**

Pegasus is interested to hear your views on the documents we provide. To give your feedback, send an email to [feedback@pegasus.co.uk](mailto:feedback@pegasus.co.uk). Please type "Opera 3 Install Guide" in the subject box.

Please note that product support is not offered through the above email address.

## Deployment Options

### **Installation Fundamentals**

The Opera 3 installation consists of two distinct parts: Server software and Client software. The installation CD contains all of the files necessary for both; however, only the server installation can be performed directly from the CD.

In order to install the Client software, the Server must have already been installed. This is because the Client installation program is run from the *Client Setup* subfolder on the server that is created during the Server installation.

The installation of the Client installs all the necessary files needed to run Opera 3 from the client computer.

### **Stand-Alone Installations**

The stand-alone installation is the simplest deployment of Opera 3. The Client and Server software are both installed on a single computer.

This type of installation suits single user sites, where only one user requires access to Opera 3 at any one time. This can be a laptop or desktop computer that meets the minimum requirements detailed in the System Requirements guide, which is on the Opera 3 CD.

### **Client-Server Installations**

In this type of installation, the Server software is installed on a different computer to that of the Client. Clients connect to the server across the Local Area Network (LAN).

This type of installation allows multiple Clients to access the same Server installation and therefore suits multi-user sites, where many users require access to Opera 3 at any one time.

### **[VFP] SPM Remote Installations**

An SPM (Sales Pipeline Management) Remote installation is a stand-alone deployment of Opera 3. The Client and Server software are both installed on a single laptop computer.



Opera 3 uses a Microsoft Visual FoxPro database and Opera 3 SQL uses a Microsoft SQL Server database. Pegasus Document Management, which is part of both Opera 3 and Opera 3 SQL, also uses a Microsoft SQL Server database.

### **[VFP] Microsoft Visual Foxpro**

Opera 3 uses a Microsoft Visual FoxPro database. The application is designed for stand-alone computers and for networked Client-Server environments. All of the necessary Visual FoxPro components are installed as part of the Opera 3 installation.

### **[SQL] Microsoft SQL Server**

Opera 3 SQL uses a Microsoft SQL Server database. The application is designed for a networked Client-Server environment. Microsoft SQL Server must be already installed and running on the network server computer before Opera 3 SQL is installed.

The supported Microsoft SQL Server databases are the following:

For Opera 3 SQL:

- Microsoft SQL Server 2012 (Service Pack 1)
- Microsoft SQL Server 2008 R2 (Service Pack 1)
- Microsoft SQL Server 2008 (Service Pack 2)
- Microsoft SQL Server 2005 (Service Pack 3)
- Microsoft SQL Server 2000 (Service Pack 4).

For Pegasus Document Management:

- Microsoft SQL Server 2012 (Service Pack 1)
- Microsoft SQL Server 2008 R2 (Service Pack 1)
- Microsoft SQL Server 2008 (Service Pack 2)
- Microsoft SQL Server 2008 Express (Service Pack 1)
- Microsoft SQL Server 2005 (Service Pack 3)



- Microsoft SQL Server 2005 Express (Service Pack 3)
  - Microsoft SQL Server 2000 (Service Pack 2)
  - Microsoft SQL Server Desktop Engine (MSDE).
- 

**Caution:** Windows Server 2008 and Windows SBS include a special version of SQL Server Express that holds internal configuration data. This preinstalled version of SQL Server Express cannot be used as a data store for Pegasus products.

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For Pegasus Stocktake:

- Microsoft SQL Server 2012 (Service Pack 1)
  - Microsoft SQL Server 2008 R2 (Service Pack 1)
  - Microsoft SQL Server 2008 (Service Pack 2)
  - Microsoft SQL Server 2008 Express (Service Pack 2)
  - Microsoft SQL Server 2005 (Service Pack 3)
  - Microsoft SQL Server 2005 Express (Service Pack 3).
- 

**Important:** Stocktake does not work with SQL Server 2000.

---

#### Windows User Account Control

Microsoft Windows Server 2008 and Windows Vista introduced a feature called *User Account Control* (UAC) that lets you use your computer without elevated administrator privileges until they are required. This makes it more secure from malicious software when you are connected to the internet. Even if you are a user with administrator's privileges, most programs are still run with a standard user's security permissions and you are asked before any software is installed.

All Windows products released after Windows Server 2008 and Windows Vista, for example Windows Server 2012 and Windows 8, include this feature.

Before the Opera 3 installation program runs, a UAC message like 'An unidentified program wants access to your computer' or 'Do you want to allow the following program from an unknown publisher to make changes to this computer?' may be displayed. The UAC feature is checking that you want to install the software before it allows it to continue. Click either the **Allow** button or **Yes** button when the message is displayed.

To install or upgrade Opera 3 and Opera 3 SQL, you need Administrator security permissions.



## Installation Folders

These are the suggested locations for Opera 3 installations on these Windows products:

### Opera

Bitness	Programs	Data
32-bit Windows	c:\Program Files\Pegasus\...	c:\ProgramData\Pegasus\...
64-bit Windows	c:\Program Files (x86)\Pegasus\...	c:\ProgramData\Pegasus\...

For more information about the Opera 3 folders in all supported Windows products, see [Appendix A](#) (on page 20) and [Appendix B](#) (on page 22).



## Installation Guide

### Document Management & Pegasus Dashboards

Pegasus Document Management and Pegasus Dashboards are installed independently of Opera 3. Both products are included on the Opera 3 CD and have separate installation programs and related installation guides. If you are installing and activating an Opera 3 system that includes Document Management or Pegasus Dashboards, you must install these products before running Opera 3.

---

**Important:** Follow the instructions in each installation guide when installing Document Management and Pegasus Dashboards.

---

### Document Management

Pegasus Document Management is an integrated Opera 3 application that provides secure document capture and retrieval functionality both in the Document Management module and throughout Opera 3. Paper documents and electronic files such as Word documents, Excel Spreadsheets or PDF files can be captured and securely archived.

Pegasus Document Management is installed separately from the Opera 3 installation. If you use the application, the latest version of the product must be installed from the Opera 3 CD to benefit from the latest features.

If the product is not installed, the message '*Document Management is not currently available*' is displayed when you select any of the Document Management menus in Opera 3.

You will not be able to open any of the Document Management forms until the product is installed.

### Document Management Desktop

Document Management Desktop works directly from your Microsoft Windows desktop. It is both an easy retrieval system of paper documents and electronic files that have been captured to the Document Management databases and an ad-hoc capture system to quickly capture electronic files to the Document Management databases. Document Management Desktop needs access to both the Opera Server installation and the Document Management databases. However, the Opera Client software does not need to be installed on the computer to use Document Management Desktop.

### Pegasus Dashboards



Pegasus Dashboards provides a flexible way of displaying your Opera 3 or Opera 3 SQL data in a graphical format in Microsoft Internet Explorer. The product uses special views to display your Opera 3 data that are created by the Update Data Structures (UDS) command in Opera 3 if Pegasus Dashboards is installed.

If you use Pegasus Dashboards, the latest version of the product must be installed from the Opera 3 CD before the UDS command is run.

### **Dashboards Manager**

The Dashboards Manager module allows you to create your own custom-designed dashboards and charts to display data for all Opera 3 modules according to your requirements. Any bespoke modifications to your Opera 3 solution can also be included in your custom charts if necessary. Custom charts are displayed alongside the standard charts in Pegasus Dashboards.

Dashboards Manager is installed at the same time as the Opera 3 installation.

# Installation Guide

Installing Opera 3 for the first time on Stand-Alone PCs



Opera

## BEFORE THE INSTALLATION

- ② Log on to the computer using a user who is a member of the Administrators' group.

- ② Close all applications.

- ② If Microsoft .NET Framework 4 Extended is not installed on the computer, install it from the Microsoft web site.

Check **Add or Remove Programs** in the Control Panel (Windows XP & Windows Server 2003) or **Programs and Features** if you are unsure whether it is already installed.

- ② Insert the Opera 3 CD into the stand-alone PC to view the installation menu. The menu is displayed when you insert the CD into the PC. If it is not, double-click *Menu.exe* in the main folder on the CD.

## DOING THE INSTALLATION

- ② Click Opera 3 and then click **Release Guide** and **Readme** to read information about the release.

- ② Have your licence form ready that was supplied with your software.

- ② Click **Install Opera 3** on the installation menu to install the Opera 3 Server installation on the PC.

- ② Follow the instructions on the screen.

If a User Account Control (UAC) message is displayed, click either the **Allow** button or **Yes** button to continue.

## USING OPERA 3

- ② If you use Document Management or Pegasus Dashboards, install them before using Opera 3. For instructions, click **Pegasus Document Management** or **Pegasus Dashboards** on the install menu and then click **Installation Guide**.

- ② If you use Pegasus Scheduler, install it before using Opera 3. See page 18 for assistance.

- ② Run Opera 3 using the Desktop shortcut and enter your licence details in the **Activation** form. See page 14 for assistance.

- ② Follow the instructions in the Opera 3 Implementation guide for guidance on how to set up the applications you have purchased.

## Installation Guide



Installing Opera 3 for the first time on Client-Server installations

### BEFORE THE INSTALLATION

- ② Log on to the computer using a user who is a member of the Administrators' group.
- ② Close all applications.

### RUNNING THE SERVER INSTALLATION

- ② Click **Install Opera 3** on the installation menu to install the Opera 3 Server. The installation updates the computer's registry and the necessary files and folders so the Opera 3 Server installation must be done at the file server computer rather than from a remote PC.

- ② Follow the instructions on the screen.

### RUNNING THE CLIENT PC INSTALLATIONS

- ② Go to the `\|<Server>\Server XXX Static\Client Setup\` folder, where `<Server>` is the server's name, and `XXX` is either `VFP` or `SQL`. If the server software was installed in a non-default location, go to the `\|<Server>\Server XXX Static and Dynamic\Client Setup\` folder.

- ② Open the `Exe` subfolder and double-click `Setup.exe` to run the client installation. Repeat for each client computer.

## Installation Guide

¶ If Microsoft .NET Framework 4 Extended is not installed on the server, install it from the Microsoft web site.

Check **Add or Remove Programs** in the Control Panel (Windows XP & Windows Server 2003) or **Programs and Features** if you are unsure whether it is already installed.

**Note:** This is not required on Opera 3 client workstations.

¶ Insert the Opera 3 CD into the server computer. Then click Opera 3 and then click **Release Guide** and **Readme** to read information about the release.

¶ Have your licence form that was supplied with your software ready to add your activation details.

¶ Open the **Pegasus Opera 3 Server** desktop folder and double-click the **Install Client** shortcut to install the Opera 3 Client Installation on the server computer.

¶ Open the **Pegasus Opera 3** desktop folder and double-click the **Opera 3** shortcut to run Opera 3 on the server computer.

¶ Enter your licence details in the Opera 3 **Activation** form. See page 14 for assistance.

¶ Ensure that everyone has the necessary security permissions on the client computer.

1. Go to the Opera 3 client installation folder. (*C:\Program Files\Pegasus\O3 Client XXX* or *C:\Program Files (x86)\Pegasus\O3 Client XXX* where XXX is either *VFP* or *SQL*.)
  2. Right-click the Client installation's folder.
  3. Select **Properties**.
  4. Click the **Security** tab and select each user's name
  5. Tick the **Full Control** box in the **Allow** column.
6. Click **OK**.

¶ If you use Document Management or Pegasus Dashboards, install them before using Opera 3. For instructions, click **Pegasus Document Management** or **Pegasus Dashboards** on the install menu and then click **Installation Guide**.

¶ If you use Pegasus Scheduler or Stocktake, install them before using Opera 3. See pages 18 and 19.

¶ Follow the instructions in the Opera 3 Implementation guide for guidance on how to set up the applications you have purchased.

## Installation Guide

Upgrading from earlier versions of Opera 3



Opera

### BEFORE THE INSTALLATION

- ② Log on to the computer using a user who is a member of the Administrators' group.

- ② Close all applications.

② If Microsoft .NET Framework 4 Extended is not installed on the server, install it from the Microsoft web site.  
Check **Add or Remove Programs** in the Control Panel (Windows XP & Windows Server 2003) or **Programs and Features** if you are unsure whether it is already installed.

**Note:** This is not required on Opera 3 client workstations.

### RUNNING THE SERVER INSTALLATION

- ② Click **Install Opera 3** on the installation menu to upgrade the Opera 3 Server. The installation updates the computer's registry and the necessary files and folders so the Opera 3 Server installation must be done at the file server computer rather than from a remote PC.

- ② Follow the instructions on the screen.

② Open the **Pegasus Opera 3 Server** desktop folder and double-click the **Install Client** shortcut to upgrade the Opera 3 Client Installation on the server computer.

### RUNNING THE CLIENT PC INSTALLATIONS

- ② Go to the `\|<Server>\Server XXX Static\Client Setup` folder, where `<Server>` is the server's name, and `XXX` is either `VFP` or `SQL`. If the server software was installed in a non-default location, go to the `\|<Server>\Server XXX Static and Dynamic\Client Setup` folder.

- ② Open the **Exe** subfolder and double-click `Setup.exe` to run the client upgrade. Repeat for each client computer.

② Ensure that everyone still has the necessary security permissions on the client computer.

1. Go to the Opera 3 client installation folder. `(C:\Program Files\Pegasus\O3 Client XXX)` or `C:\Program Files (x86)\Pegasus\O3 Client XXX` where `XXX` is either `VFP` or `SQL`.
2. Right-click the Client installation's folder.
3. Select **Properties**.
4. Click the **Security** tab and select each user's name.
5. Tick the **Full Control** box in the **Allow** column.
6. Click **OK**.

## Installation Guide



**Opera**

¶ Insert the Opera 3 CD into the server computer to view the upgrade menu. The menu is displayed when you insert the CD into the computer. If it is not, double-click *Menu.exe* in the main folder on the CD.

¶ Click Opera 3 and then click **Release Guide** and **Readme** to read information about the release.

¶ If you have a new licence details form, have it on hand ready to add your activation details.

### Upgrading from Opera II to Opera 3

In this checklist, 'XXX' represents either VFP or SQL as appropriate for your installation. For information on paths and folders mentioned in this checklist, see [Appendix A](#) (on page 20). If bespoke projects are used with Opera II, they must be copied manually to Opera 3. They must be carefully tested to ensure they are compatible with Opera 3.

¶ Open the **Pegasus Opera 3** desktop folder and double-click the **Opera 3** shortcut to run Opera 3 on the server computer.

¶ If you have a new licence details form, enter your licence details in the **Opera 3 Activation** form. See page 14 for assistance.

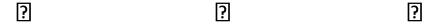
¶ If you use Document Management or Pegasus Dashboards, install the latest versions before using Opera 3. For instructions, click **Pegasus Document Management** or **Pegasus Dashboards** on the install menu and then click **Installation Guide**.

¶ If you use Pegasus Scheduler or Stocktake, install them before using Opera 3. See pages 18 and 19.

¶ Follow the instructions in the **Opera 3 Implementation guide** for guidance on how to set up any new applications you have purchased.

## Installation Guide

### BEFORE THE UPGRADE



② Close Opera II and make sure everyone is logged out of the application.

② Take a full backup of your Opera II installation from which you intend to upgrade, including system, data, reports, etc.

② Close all other applications. Then follow the steps in the [Installing Opera 3 for the first time on Client-Server installations](#) checklist above to install Opera 3 Server and Client installations on the same server computer as the Opera II server. These must both exist on the same computer in order to upgrade.

② If you are using any special bespoke applications or reports with Opera II, copy the files to the Opera 3 location.

② If you have **Reporter** reports appended to the Opera II menus, take a note of these. You will need to append them to the Opera 3 menus after upgrading.

### UPGRADING SYSTEM AND DATA FILES



② Run Opera 3, enter your activation key Log and log in to the application as **ADMIN**. See page 14 for assistance.

② Open the **Upgrade - System Upgrade** form. Follow the on-screen prompts to copy the Opera II system files to Opera 3.

② Log out of Opera 3.

If you need to move the company data, do this manually using Windows Explorer after running the **System Upgrade** wizard.

Then change the data path on the **Company Profiles** form for each company to the new location.

### AFTER THE UPGRADE



② Log in to Opera 3 again

② Open the **System - Utilities - Update Data Structures** form and select all companies. Complete the steps to update the files to the Opera 3 format.

② Check the details on these forms on the **System - Maintenance** menu are correct: People Profiles, User Profiles, Company Profiles, Report Layout and E-Mail Profiles. Check that the system preferences on the **System - Utilities** menu are correct. Also ask each user to check the **System - Preferences** form to ensure their user preferences are correct.

② If you use Document Management or Pegasus Dashboards, install the latest versions before using Opera 3. For instructions, click **Pegasus Document Management** or **Pegasus Dashboards** on the install menu and then click **Installation Guide**.

② If you intend to use **Pegasus Scheduler** or **Stocktake**, install them before using Opera 3. See pages 18 and 19 for assistance.

② If you had **Reporter** reports appended to your Opera II menus, append them to the Opera 3 menus using the **Append to Menu** command from the **Report Manager** form.

## Installation Guide

After using Opera 3 for a period of time, you may remove the Opera II installation if you want to. Take a full data backup beforehand.

# Installation Guide



## Activating the Software and Logging On

When launching the software for the first time, the **Activation** form is displayed. At this point you can choose to activate your software with the unique activation details for your installation or use a demonstration database in order to familiarise yourself with the software.

### DEMONSTRATION AND EVALUATION ACTIVATIONS

② To evaluate the software using the demonstration data, enter either *EVAL* or *DEMO* in the **Activation Key** box.

- DEMO opens Orion Vehicles Leasing – a demonstration company which is refreshed every time you use Opera 3 until you enter your activation details.
- EVAL also opens Orion Vehicles Leasing and is not refreshed until a limit is reached. If you are using demonstration data with Opera 3 SQL, a form is displayed for specifying the location of the demonstration data. Select or overtype the SQL Server and Database names as required and click OK.

② Enter a User ID of either *MANAGER* or *ADMIN* and leave the password blank. Then click **Logon**.

### CUSTOMER ACTIVATIONS

② To activate your software with the unique activation details for your installation, enter the activation details supplied with your software exactly as shown on the **Activation Details** form, including the correct letter case. Then click **Activate**. You must enter your:

- Company Name,
- Post Code,
- Activation Date,
- Licence Number, Serial Number and Activation Key.

If you fail to enter these details accurately, you are denied access to the software.

② In case of difficulty, consult your Pegasus Partner.

② If the licence details include SPM Remote capabilities, the activation process includes the message '*The details include Sales Pipeline Management Remote capabilities. Do you want to activate this system for remote use?*' - Select **Yes** if the PC will be used as an SPM Remote laptop.  
- Select **No** if the computer is part of the Opera 3 back-office system.

## Installation Guide



### Running Updating Data Structures

Update Data Structures checks the integrity of the data files and ensures that the system database and company databases reflect the latest data structures defined in the Opera 3 data dictionary. The data dictionary comprises the tables and fields in the application, which change from one release to the next. Update Data Structures must be used after upgrading from Opera II, after upgrading from earlier versions of Opera 3, or after upgrading from Opera 3 to Opera 3 SQL.

If you use the Additional Systems feature, which allows more than 36 companies to be used in Opera 3, you must run Update Data Structures in each system.

---

**Tip:** You can use Pegasus Scheduler to run Update Data Structures automatically at a chosen time. Instructions to install Pegasus Scheduler are detailed on page 18 of this guide.

---

#### UPDATING DATA STRUCTURES



- ② Log on to Opera 3 as the *ADMIN* user.

## Installation Guide

- ② Run the **System - Utilities - Update Data Structures** form without selecting any companies. This will update the system files for this release of Opera.
  - Follow the instructions on the form.
- ② Open the **System - Maintenance - User Profiles** form. In the **Allow Access to Companies** section at the bottom of the form, select all companies you want to include in the update and data validation process. The **Update Data Structures** command will update only the companies you select here.
  - Save the changes and close the form.
- ② Log off and then log on again as the ADMIN user. You will now have access to the companies you selected on the **User Profiles** form.
- ② Use the **System - Utilities - Backup** form to back up your data.
- ② Run the **System - Utilities - Update Data Structures** form.
  - Click **Next** and select the companies to update. Click **Next** again. If the Payroll application is used, select all the companies to update their statutory rates. This is necessary only if the statutory rates have not been updated for the current tax year. Click **Next** again.
  - Select the administrator options as necessary on the third page. Then click **Next** again to start the update.
- ② When the update is complete, select the **View Audit File** button to see the audit log that was created during the update. If there were any problems they will be recorded in the log.
- ② See the F1 Help for details about the **Update Data Structures** command.

## Installation Guide

### Removing Opera 3



The following instructions apply to uninstalling both the Client and Server software. The Client software should be uninstalled from each client PC. If both the Client and Server software are installed on the same PC, we recommend you uninstall the Client software before uninstalling the Server software.

For Server installations, the uninstall process removes the files and registry entries created during the installation. Some components may be left on the computer. For example, if you have created data files or used the demonstration data, the Pegasus folder is not removed. For Client installations, the uninstall process removes those files and registry entries that were created during the installation and are unique to the product, but not all the baggage files like the DLL and OCX files that were installed are removed. You can remove any remaining files and folders using Windows Explorer. If any of the Microsoft Core Components were installed because the programs supplied with Opera 3 were later than those already on the computer, they will remain on the computer after the un-installation is complete.

---

**Windows Group Policy:** To remove Opera 3 Clients that were installed using Windows Group Policy, you must remove the Group Policy Object (GPO) for the Opera 3 Client installation in the Microsoft Windows Group Policy software and select the "Immediately Un-Install the software from Users and Computers" option.

---

#### WINDOWS SERVER 2008 , WINDOWS VISTA AND LATER

- ②
- ②

② Open the Windows **Control Panel**.

② Click **Uninstall a Program**. A message like '*An unidentified program wants access to your computer or Do you want to allow the following program from an unknown publisher to make changes to this computer?*' may be displayed before you remove software from the computer. Click either the **Allow** button or **Yes** button to continue.

#### WINDOWS SERVER 2003 OR WINDOWS XP

② Open the Windows **Control Panel**.

② Double-click **Add or Remove Programs**.

## Installation Guide

② Select *Pegasus Opera 3 Client* from the list.

② Click **Uninstall** and follow the on-screen instructions.

② Select *Pegasus Opera 3 Server* from the list.

② Click **Uninstall** and follow the on-screen instructions.

② Using **Windows Explorer**, check the *Static* and *Dynamic* locations for files and folders left on the computer and remove them.

② Select *Pegasus Opera 3 Client* from the list.

② Click **Remove** and follow the on-screen instructions.

② Select *Pegasus Opera 3 Server* from the list.

② Click **Remove** and follow the on-screen instructions.

② Using **Windows Explorer**, check the *Static* and *Dynamic* locations for files and folders left on the computer and remove them.



## Repairing Opera 3

You can use the **Repair** option in the Windows **Control Panel** to repair some problems with the Opera 3 server or Opera 3 client installations. The instructions to use the

**Repair** option depend on the Microsoft Windows product you use. It may however be necessary to uninstall and then reinstall the software. See the [Removing Opera 3](#) checklist for instructions on how to remove the server and Client software.

### WINDOWS SERVER 2008 AND LATER, WINDOWS VISTA AND LATER

②      ②

② Open the Windows **Control Panel**.

② Click **Programs**.

### WINDOWS SERVER 2003 OR WINDOWS XP

② Open the Windows **Control Panel**.

② Double-click **Add or Remove Programs**.

## Installation Guide

② Click **Programs and Features**.

③ Select *Pegasus Opera 3 Server* from the list.

④ Right-click and select **Repair**.

⑤ Follow the on-screen instructions.

⑥ When the server installation has been repaired, select *Pegasus Opera 3 Client* from the list.

⑦ Right-click and select **Repair**.

⑧ Follow the on-screen instructions.

② Select *Pegasus Opera 3 Server* from the list.

③ Click **Change** and then click **Next**.

④ On the **Program Maintenance** form, click **Repair**.

⑤ Click **Next** and then click **Install** and follow the on-screen instructions.

⑥ When the server installation has been repaired, select *Pegasus Opera 3 Client* from the list.

⑦ Click **Change** and then click **Next**.

⑧ On the **Program Maintenance** form, click **Repair**.

⑨ Click **Next** and then click **Install** and follow the on-screen instructions.



Installing or Upgrading Pegasus Scheduler

INSTALLING OPERA 3 AND MICROSOFT .NET4

①

INSTALLING THE SERVER AND CLIENT ON THE  
OPERA 3 SERVER

②

INSTALLING THE CLIENT ON THE OPERA 3  
WORKSTATIONS

③

④

⑤

## Installation Guide

② At the Opera 3 Server, install the latest version of Opera 3.

Follow the [Installing Opera 3 for the first time on Stand-Alone PCs](#) checklist, the [Installing Opera 3 for the first time on Client-Server installations](#) checklist, or the [Upgrading from earlier versions of Opera 3](#) checklist.

**Install both the Opera 3 server and client installations.**

② If Microsoft .NET Framework 4 Extended is not installed, install it from the Microsoft web site. Microsoft .NET Framework 4 Extended must be installed on the Opera 3 server and all Opera 3 client computers where Pegasus Scheduler will be installed. Check **Add or Remove Programs** in the Control Panel (Windows XP & Windows Server 2003) or **Programs and Features** if you are unsure whether it is already installed.

② Make sure that no one is logged in to Opera 3.

② Make sure that all applications are closed and also that the Opera 3 CD is inserted in the Opera 3 server.

② At the Opera 3 Server, install the Pegasus Scheduler server software. From the CD setup menu, click **Pegasus Scheduler** and then click **Install Pegasus Scheduler**. The setup menu is displayed when you insert the CD into the server. If it is not displayed, run *Menu.exe* from the main folder on the CD.

② At the Opera 3 Server, install or upgrade the Pegasus Scheduler client software.

Run *Setup.exe* from either:

- *C:\Program Files\Pegasus\Scheduler Server\ClientSetup (32-bit Windows)* or
- *C:\Program Files (x86)\Pegasus\Scheduler Server\ClientSetup (64-bit Windows)*.

② At the Opera 3 Server, set permissions to the *\|\<Server>\Scheduler Dynamic\* shared location for all Scheduler users to *Full Control*.

**INSTALL THE CLIENT ON THE SAME WINDOWS FAMILY**

**AS THE SERVER INSTALLATION**

- SERVER 2003 & XP ②
- SERVER 2008/2011/2012 & VISTA/WINDOWS 7,8 ②
- SERVER 2008/2011/2012 & XP. ②
- SERVER 2003 & VISTA/WINDOWS 7,8 ②

② On each Opera 3 workstation where Pegasus Scheduler will be used, install or upgrade the client software.

Run *Setup.exe* from the *\|\<Server>\Scheduler Static\ClientSetup\* shared location (where *<Server>* is the Opera 3 server).

② To use Pegasus Scheduler in Opera 3, open the **System - Scheduling** folder or click the **Administration** tab on the Ribbon Bar and click **System – Scheduling**. Then click **Task Scheduler**.

**The Task Scheduler is displayed only if it is included in your Opera 3 licence.**

② Use the **F1 key** for help with using Pegasus Scheduler.

## Installation Guide



## INSTALLING OPERA 3 AND MICROSOFT .NET4

If the latest version of Opera 3 is not installed, install it on the Opera 3 server by using either the [Installing Opera 3 for the first time on Stand-Alone PCs checklist](#), the [Installing Opera 3 for the first time on Client-Server installations checklist](#), or the [Upgrading from earlier versions of Opera 3 checklist](#).

Both the client and server installations must be installed.

Install Microsoft .NET Framework 4 Extended if it is not already installed. You can install it from the Microsoft web site.

Check **Add or Remove Programs** in the Control Panel (Windows XP & Windows Server 2003) or **Programs and Features** if you are unsure whether it is already installed.

Install Microsoft SQL Server if it is not already installed. Supported versions of SQL Server are detailed on page 7.

## DOING THE STOCKTAKE INSTALLATION

**Important:** Stocktake is a standalone application which relies on the Opera 3 Client being installed. You must install both the Opera 3 Client and Stocktake on the computer where Stocktake will be used. Stocktake is designed to be installed on one computer only.

From the Opera 3 CD installation menu, click **Pegasus Stocktake** and then click **Install Pegasus Stocktake**.

The install menu is displayed when you insert the CD into the computer. If it is not, doubleclick *Menu.exe* in the main folder on the CD.

Follow the instructions on the screen. You are notified when Stocktake is installed successfully.

## AFTER NEW STOCKTAKE INSTALLATIONS

Run Opera 3 and open the System folder and click **Maintenance - Company Profiles** or click the **System** tab on the Ribbon Bar and then click **Company Profiles**.

On the **Options** tab on the **Company Profiles** form, tick the **Stocktake** option.

Run the **Update Data Structures** command from the **System – Utilities** menu to create a default Stocktake Profile.

Open the **Stock** folder and click **Stocktake** or click the **Supply Chain Management** tab on the Ribbon Bar and then click **Stock – Stocktake**.

❑ Enable SQL Server's TCP/IP protocol in SQL Server Configuration Manager if Stocktake will not be installed on the same computer where SQL Server is installed.

❑ Make sure that no one is logged in to Opera 3 and all other applications are closed.

**If you have upgraded an existing Stocktake installation, Stocktake is now ready to be used. For new installations, follow the instructions under “AFTER NEW STOCKTAKE INSTALLATIONS”.**

❑ Select the Microsoft SQL Server installation from the list and enter the name of the database for Stocktake. This only applies for new installations of Stocktake; upgrades will use the same database as before.

❑ Use the **F1 key** for help with using Pegasus Stocktake.

## Appendix A – Opera 3 Server Folders

Where ‘XXX’ is mentioned, it refers to either VFP or SQL as appropriate for your installation. ‘x86’ refers to 32-bit Windows products. ‘x64’ refers to 64-bit Windows products.

### Folders for Static Data (Read)

<b>Windows</b>	<b>Folder</b>
Windows Server 2012	C:\Program Files (x86)\Pegasus\Server XXX
Windows SBS 2011 Essentials	C:\Program Files (x86)\Pegasus\Server XXX
Windows SBS 2011	C:\Program Files (x86)\Pegasus\O3 Server XXX
Windows Server 2008 64-bit (x64)	C:\Program Files (x86)\Pegasus\O3 Server XXX
Windows Server 2008 32-bit (x86)	C:\Program Files\Pegasus\O3 Server XXX
Windows Server 2008 64-bit (x64)	C:\Program Files (x86)\Pegasus\O3 Server XXX
Windows Server 2003	C:\Program Files\Pegasus\O3 Server XXX
Windows 8 (x86)	C:\Program Files\Pegasus\Server XXX
Windows 8 (x64)	C:\Program Files (x86)\Pegasus\Server XXX
Windows 7 (x86)	C:\Program Files\Pegasus\O3 Server XXX
Windows 7 (x64)	C:\Program Files (x86)\Pegasus\O3 Server XXX
Windows Vista 32-bit (x86)	C:\Program Files\Pegasus\O3 Server XXX
Windows Vista 64-bit (x64)	C:\Program Files (x86)\Pegasus\O3 Server XXX
Windows XP	C:\Program Files\Pegasus\O3 Server XXX

The following subfolders are under this location:

<b>Folder</b>	<b>Purpose</b>
Client Setup	Contains the files necessary to install the Opera 3 client
Framework Support	Contains files and additional folders concerning the application’s framework for bespoke software development
Group Policy	Contains the files and settings concerning the automatic deployment of Client software

### Folders for Dynamic Data (Read/Write)

The location of the Dynamic (read-write) data for the Server installation depends on the Windows product on the computer.

<b>Windows</b>	<b>Folder</b>
Windows Server 2012	C:\ProgramData\Pegasus\Server XXX
Windows SBS 2011	C:\ProgramData\Pegasus\O3 Server XXX
Windows Server 2008 64-bit (x64)R2	C:\ProgramData\Pegasus\O3 Server XXX
Windows Server 2008 32-bit (x86)	C:\ProgramData\Pegasus\O3 Server XXX
Windows Server 2008 64-bit (x64)	C:\ProgramData\Pegasus\O3 Server XXX

Windows Server 2003	C:\Documents and Settings\All Users\Application Data\Pegasus\O3 Server XXX
Windows 8 (x86)	C:\ProgramData\Pegasus\Server XXX
Windows 8 (x64)	C:\ProgramData\Pegasus\Server XXX
Windows 7 (x86)	C:\ProgramData\Pegasus\O3 Server XXX
Windows 7 (x64)	C:\ProgramData\Pegasus\O3 Server XXX
Windows Vista 32-bit (x86)	C:\ProgramData\Pegasus\O3 Server XXX
Windows Vista 64-bit (x64)	C:\ProgramData\Pegasus\O3 Server XXX
Windows XP	C:\Documents and Settings\All Users\Application Data\Pegasus\O3 Server XXX

## Dynamic Data

The following subfolders are under the Dynamic Data location:

**Important:** The names and structure of these folders are important. They must not be renamed or amended in any way. New folders must not be created in this location using Windows Explorer.

Folder	Contains
Backup	Backup files when they are generated using the Backup function in Opera 3.
Bespoke	Files relevant to third-party development
Data	Company database files.
DataDict	Data dictionary used by the Opera 3 application
DataDictCore	A version of the data structures as they are at the time of installation. Needed for bespoke software development and Update Data Structures
DemoData	Demonstration data files (Company Z)
FrameworkSupport	Files and folders concerning the framework
Reporter	Data folder containing files relevant to the Reporter module
Reports	Report definitions
System	Various system files including company and licence information, and menu definitions

## Appendix B – Opera 3 Client Folders

Where ‘XXX’ is mentioned, it refers to either VFP or SQL as appropriate for your installation.

### Folders for Program ‘Static’ Data (Read)

By default, read-only client data is installed in the following location:

<b>Windows</b>	<b>Folder</b>
Windows Server 2012	C:\Program Files (x86)\Pegasus\O3 Client XXX
Windows SBS 2011	C:\Program Files (x86)\Pegasus\O3 Client XXX
Windows Server 2008 64-bit (x64)	C:\Program Files (x86)\Pegasus\Client XXX
Windows Server 2008 32-bit (x86)	C:\Program Files\Pegasus\O3 Client XXX
Windows Server 2008 64-bit (x64)	C:\Program Files (x86)\Pegasus\Client XXX
Windows Server 2003	C:\Program Files\Pegasus\O3 Client XXX
Windows 8 (x86)	C:\Program Files\Pegasus\O3 Client XXX
Windows 8 (x64)	C:\Program Files (x86)\Pegasus\O3 Client XXX
Windows 7 (x86)	C:\Program Files\Pegasus\O3 Client XXX
Windows 7 (x64)	C:\Program Files (x86)\Pegasus\O3 Client XXX
Windows Vista 32-bit (x86)	C:\Program Files\Pegasus\O3 Client XXX
Windows Vista 64-bit (x64)	C:\Program Files (x86)\Pegasus\O3 Client XXX
Windows XP	C:\Program Files\Pegasus\O3 Client XXX

The following subfolders are under this location:

<b>Folder</b>	<b>Contains</b>
Auxiliary	Program needed for the Sales Pipeline Management, Service Management and Helpdesk modules
Classes	Files relevant for bespoke software development
Framework	Files and additional folders concerning the application’s framework
Framework	
Support	
PrinterInst	Programs and other files needed to create PDF reports in the application
User	Demonstration Data Guide, Implementation Guide, Installation Guide, and
Documents	Release Guide

### Folders for ‘Dynamic’ Data (Read/Write)

The location of the Dynamic (read-write) data for the client installation depends on the Windows product used.

<b>Windows</b>	<b>Folder</b>
Windows Server 2012	C:\ProgramData\Pegasus\O3 Client XXX
Windows SBS 2011	C:\ProgramData\Pegasus\O3 Client XXX
Windows Server 2008 64-bit (x64)	C:\ProgramData\Pegasus\O3 Client XXX

Windows Server 2008	C:\ProgramData\Pegasus\O3 Client XXX
Windows Server 2003	C:\Documents and Settings\All Users\Application Data\Pegasus\O3 Client XXX
Windows 7	C:\ProgramData\Pegasus\O3 Client XXX
Windows Vista	C:\ProgramData\Pegasus\O3 Client XXX
Windows XP	C:\Documents and Settings\All Users\Application Data\Pegasus\O3 Client XXX

This subfolder is under this location:

**Folder Contains**

Temp	Various temporary files created during certain processes
------	--

## Appendix C – Opera 3 Share Names

The following table shows the network share names created during the Server installation and the Client executable installation on the server computer (where 'XXX' is either VFP or SQL).

Where 'XXX' is mentioned, it refers to either VFP or SQL as appropriate for your installation. The folders listed in the above table assume the default folder locations have been selected during the installation.

### Windows Server 2003 and Windows XP

<b>UNC Share Name</b>	<b>Folder</b>
Server XXX Static	C:\Program Files\Pegasus\O3 Server XXX
Server XXX Dynamic	C:\Documents and Settings\All Users\Application Data\Pegasus\O3 Server XXX
Server XXX Static and Dynamic	If you selected an alternative location selected for the Server installation, this share includes the folders for both static and dynamic data.
Client XXX Static	C:\Program Files\Pegasus\O3 Client XXX

### Windows Server 2008, Windows Vista, Windows 7 (32-bit) and Windows 8 (32-bit)

<b>UNC Share Name</b>	<b>Folder</b>
Server XXX Static	C:\Program Files\Pegasus\O3 Server XXX
Server XXX Dynamic	C:\ProgramData\Pegasus\O3 Server XXX
Server XXX Static and Dynamic	If you selected an alternative location selected for the Server installation, this share includes the folders for both static and dynamic data.
Client XXX Static	C:\Program Files\Pegasus\O3 Client XXX

### Windows Server 2012, Windows Server 2012 Essentials, Windows SBS 2011 Essentials, Windows Server 2008, Windows Vista (64-bit), Windows 7 (64-bit) and Windows 8 (64-bit)

<b>UNC Share Name</b>	<b>Folder</b>
Server XXX Static	C:\Program Files (x86)\Pegasus\Server XXX
Server XXX Dynamic	C:\ProgramData\ Pegasus\Server XXX

Server XXX Static and Dynamic If you selected an alternative location selected for the Server installation, this share includes the folders for both static and dynamic data.

Client XXX Static C:\Program Files (x86)\Pegasus\Client XXX

### Share Permissions for Opera 3 Client and Server Installations

Everyone using Opera 3 must have full permissions for both the Client and Server folders. The installation of the Opera 3 Client and Opera 3 Server sets each folder's share permissions to *Full Control*, *Change*, and *Read*. The installation then assigns the permissions to a group called *Everyone*. This Windows group affects everyone using the server and client computers.

---

**Important:** If you do not want everyone using either the server or client computers to have full access to these folders you should create a new group that includes only those people who need access to the folders, give the group full permissions, then lastly remove the *Everyone* group. For example, you could create a group called Pegasus Users and assign full rights just to this group.

---

## Appendix D – Pegasus Stocktake Folders

### Folders for Static Data (Read)

The default location for program files contains a *Pegrel.txt* file as well as required program files. It also contains a linked help file (Stocktake.chm).

Windows	Folder
Windows Server 2012	C:\Program Files (x86)\Pegasus\Stocktake
Windows SBS 2011	C:\Program Files (x86)\Pegasus\Stocktake
Windows Server 2008 64-bit (x64)R2	C:\Program Files (x86)\Pegasus\Stocktake

Windows Server 2008 32-bit	C:\Program Files\Pegasus\Stocktake
(x86)	
Windows Server 2008 64-bit	C:\Program Files
(x64)	(x86)\Pegasus\Stocktake
Windows Server 2003	C:\Program Files\Pegasus\Stocktake
Windows 7 (x86)	C:\Program Files\Pegasus\Stocktake
Windows 7 (x64)	C:\Program Files
	(x86)\Pegasus\Stocktake
Windows Vista 32-bit (x86)	C:\Program Files\Pegasus\Stocktake
Windows Vista 64-bit (x64)	C:\Program Files
	(x86)\Pegasus\Stocktake
Windows XP	C:\Program Files\Pegasus\Stocktake

#### **Folders for Dynamic Data (Read/Write)**

The location of the Dynamic (read-write) data for Stocktake depends on the Windows product on the computer.

This location contains a *Pegrel.txt* file which holds the version of Stocktake. The location also holds the *Settings.xml* which holds configuration settings for the Stocktake database (SQL Stocktake database details) and is recommended not to be opened or edited.

Any errors which occur within Stocktake are logged here.

<b>Windows</b>	<b>Folder</b>
Windows Server 2012	C:\ProgramData\Pegasus\Stocktake
Windows SBS 2011	C:\ProgramData\Pegasus\Stocktake
Windows Server 2008 64bit (x64)R2	C:\ProgramData\Pegasus\Stocktake
Windows Server 2008	C:\ProgramData\Pegasus\Stocktake
Windows Server 2003	C:\Documents and Settings\All Users\Application Data\Pegasus\Stocktake
Windows 7 (x86)	C:\ProgramData\Pegasus\Stocktake
Windows 7 (x64)	C:\ProgramData\Pegasus\Stocktake
Windows Vista	C:\ProgramData\Pegasus\Stocktake

Windows XP C:\Documents and Settings\All Users\Application Data\Pegasus\Stocktake

## Appendix E – Pegasus Scheduler Folders

### Folders for Static Data (Read)

The default location for program files contains a *Pegrel.txt* file as well as *ScheduleRunner.exe* – the program file for running task that are set up in Scheduler. A folder called **ClientSetup** contains the Scheduler client installation file.

Windows	Folder
Windows Server 2012	C:\Program Files (x86)\Pegasus\ Scheduler Server
Windows SBS 2011	C:\Program Files (x86)\Pegasus\ Scheduler Server
Windows Server 2008 64bit (x64)R2	C:\Program Files (x86)\Pegasus\ Scheduler Server
Windows Server 2008 32bit (x86)	C:\Program Files\Pegasus\ Scheduler Server
Windows Server 2008 64bit (x64)	C:\Program Files (x86)\Pegasus\ Scheduler Server
Windows Server 2003	C:\Program Files\Pegasus\Scheduler Server
Windows 7 (x86)	C:\Program Files\Pegasus\Scheduler Server
Windows 7 (x64)	C:\Program Files (x86)\Pegasus\Scheduler Server
Windows Vista 32-bit (x86)	C:\Program Files\Pegasus\Scheduler Server
Windows Vista 64-bit (x64)	C:\Program Files (x86)\Pegasus\Scheduler Server
Windows XP	C:\Program Files\Pegasus\Scheduler Server

### Folders for Dynamic Data (Read/Write)

The location of the Dynamic (read-write) data for Scheduler depends on the Windows product on the Opera 3 server.

This location contains a *Pegrel.txt* file which holds the version of Scheduler. The location also holds various files which hold configuration settings and task results. A folder called **History** contains the audit logs for each task run in the Scheduler.

Any errors which occur within Stocktake are logged here.

<b>Windows</b>	<b>Folder</b>
Windows Server 2012	C:\ProgramData\Pegasus\Scheduler Server
Windows SBS 2011	C:\ProgramData\Pegasus\Scheduler Server
Windows Server 2008 64bit (x64)R2	C:\ProgramData\Pegasus\Scheduler Server
Windows Server 2008	C:\ProgramData\Pegasus\Scheduler Server
Windows Server 2003	C:\Documents and Settings\All Users\Application Data\Pegasus\ Scheduler Server
Windows 7	C:\ProgramData\Pegasus\Scheduler Server
Windows Vista	C:\ProgramData\Pegasus\Scheduler Server
Windows XP	C:\Documents and Settings\All Users\Application Data\Pegasus\ Scheduler Server

#### Appendix F – Pegasus Scheduler Share Names

##### **Windows Server 2008, Windows Vista, Windows 7 (32-bit) and Windows 8 (32-bit)**

<b>UNC Share Name</b>	<b>Folder</b>
Scheduler Static	C:\Program Files\Pegasus\Scheduler Server
Scheduler Dynamic	C:\ProgramData\Pegasus\Scheduler Server

##### **Windows Server 2012, Windows Server 2012 Essentials, Windows SBS 2011 Essentials, Windows Server 2008, Windows Server 2008 R2, Windows Vista (64-bit), Windows 7 (64-bit) and Windows 8 (64-bit)**

<b>UNC Share Name</b>	<b>Folder</b>
-----------------------	---------------

Scheduler Static	C:\Program Files (x86)\Pegasus\Scheduler Server
Scheduler Dynamic	C:\ProgramData\Pegasus\Scheduler Server

## Appendix G – Programs and other Important Files

### **Program / File Purpose**

Menu.exe      The ‘one-stop shop’ installation menu program on the Opera 3 CD to run the install programs for Opera 3, Pegasus Scheduler, Pegasus Stocktake, Online Filing Manager, Pegasus Instant Messenger, Document Management and Pegasus Dashboards. You can also view user guides from here.

Pegasus Opera 3      The setup program for Client installations

#### Client.msi

Opera.exe      The application program for Opera 3  
Opera.chm      The compiled HTML Help system for Opera 3  
AppPath.ini      A file that points to the location of the Opera.ini file  
Opera.ini      The Opera 3 initialisation file  
Opera.sys      The system file containing the customer activation key  
Pegrel.txt      The Pegasus Release file

## *Appendix 98: Pegasus Opera 3 – System Requirements Appendix*

### File Server Requirements

These are the recommended requirements for Opera installed on file servers. The requirements are different if installations include Pegasus Document Management.

Windows Server 2012	Windows Server 2012 Essentials	Windows Small Business Server Essentials 2011	(1)	(2)
---------------------	--------------------------------	---	-----	-----

(1) Windows Server 2008 (x86 & x64) SP2  
Small Business Server 2008 (x64) SP  
Windows Server 2008 R2 (x64) SP1  
( )

(2) Windows Server 2003 (x86) SP2  
Windows Server 2003 R2 (x86) SP2  
Small Business Server 2003 (x86) SP2  
( )

### Installations without Document Management

<b>Intel Processor</b>	Quad core 2 GHz 64-bit	Quad core 2 GHz 64-bit	Quad core 2 GHz 64-bit	Core 2 Duo 2.66GHz or above	Core 2 Duo 2.66GHz or above
------------------------	------------------------	------------------------	------------------------	-----------------------------	-----------------------------

<b>Space for Programs</b>	500 MB <sup>(3)</sup>				
<b>Memory</b>	4 GB	10 GB	10 GB	4 GB	4 GB

#### Installations with Document Management

<b>Intel Processor</b>	Not supported	Not supported	Xeon 3 GHz or above		
<b>Space for Programs</b>	Not supported	Not supported	850 MB <sup>(4)</sup>		
<b>Memory</b>	Not supported	Not supported	10 GB	4 GB	4 GB

#### All Installations

<b>Monitor</b>	1280 (width) x 1024 (height)
<b>Network Card</b>	100 Megabit per second (Mbps)
<b>Backup Device</b>	Yes

(1)

Windows Server 2008 has been tested using 32-bit (x86) systems and 64-bit (x64) systems.

(2)

Windows Server 2003 has been tested using 32-bit (x86) systems only (64-bit systems are not supported).

(3)

Includes required disk space for the Opera Client installation.

(4)

Includes required disk space for the Opera Client installation and Microsoft .Net Framework v2.



**Note:** Opera SQL has been tested using SQL Server 2005 (SP3), SQL Server 2008 (SP2) and SQL Server 2008 R2 (SP1).

---

#### Stand-Alone Workstation Requirements

These are the recommended requirements for single PC installations (typically for demonstration purposes). The requirements are different if installations include Pegasus Document Management.



<b>Windows 8 (x86) &amp; (x64)</b>	<b>Windows 7 (x86) &amp; (x64) SP1</b>	<b>Windows Vista (x86) SP2</b>	<b>Windows Vista (x64) SP2</b>	<b>Windows XP Professional SP3</b>
(1)	(2)	(3)	(3)	(4)

**Installations without Document Management**

<b>Intel Processor</b>	Core 2 Duo 2.66GHz or above				
<b>Space for Programs (MB)</b>	500 <sup>(5)</sup>				
<b>Memory</b>	2 GB	2 GB	2 GB	2 GB	1 GB

### Installations with Document Management

<b>Intel Processor</b>	Not supported	Core 2 Duo 2.66GHz or above			
<b>Space for Programs (MB)</b>	Not supported	850 <sup>(6)</sup>			
<b>Memory (Capture PCs)</b>	Not supported	2 GB	2 GB	2 GB	2 GB
<b>Memory (Retrieval PCs)</b>	Not supported	2 GB	2 GB	2 GB	1 GB

### All Installations

<b>Monitor</b>	1280 (width) x 1024 (height)
<b>Network Card</b>	100 Megabit per second(Mbps)
<b>Backup Device</b>	Yes
<b>Extended Graphics</b>	512 Mb

(1)

Windows 8 (Enterprise and Pro) has been tested using 32-bit (x86) and 64-bit (x64) systems.

(2)

Windows 7 (SP1) (Professional and Ultimate) has been tested using 32-bit (x86) and 64-bit (x64) systems.

(3)

Windows Vista (SP2) (Business and Ultimate) has been tested using 32-bit (x86) and 64-bit (x64) systems.

(4)

Windows XP is not supported on 64-bit (x64) systems.

(5)

Includes required disk space for Opera Client installation.

(6) Also includes disk space for Opera Client installation and Microsoft .Net Framework v2.

#### Networked Workstation Requirements

These are the recommended requirements for PC workstations in a networked environment. The requirements are different if installations include Pegasus Document Management.



	<b>Windows 8 (x86) &amp; (x64)</b>
(2)	<b>Windows 7 (x86) &amp; (x64) SP1</b>
3)	<b>Windows Vista (x86) &amp;(x64) SP2</b>
(4)	<b>Windows XP Professional SP3</b>
(5)	<b>Windows 8 (x86) &amp; (x64)</b>
(2)	<b>Windows 7 (x86) &amp; (x64) SP1</b>
(3)	<b>Windows Vista (x86) &amp; (x64) SP2</b>
(4)	<b>Windows XP Professional SP3</b>
(5)	

#### **Installations without Document Management**

<b>Intel Processor</b>	Core 2 Duo 2.66GHz or above							
<b>Space for Programs (MB)</b>	100							
<b>Memory</b>	2 GB	2 GB	2 GB	1 GB	2 GB	2 GB	2 GB	1 GB

#### **Installations with Document Management**

<b>Intel Processor</b>	Not supported	Core 2 Duo 2.66GHz or above	Not supported	Core 2 Duo 2.66GHz or above
<b>Space for Programs (MB)</b>	Not supported	250 (6)	Not supported	250 (6)
<b>Memory (Capture PCs)</b>	Not supported	2 GB	Not supported	2 GB
<b>Memory (Retrieval PCs)</b>	Not supported	2 GB	2 GB	1 GB

#### All Installations

<b>Monitor</b>	1280 (width) x 1024 (height)
<b>Network Card</b>	100 Megabit per second(Mbps)
<b>Backup Device</b>	Yes
<b>Ext. Graphics</b>	512 Mb

Opera  SQL has been tested using SQL Server 2005 (SP3), SQL Server 2008 (SP2) and SQL Server 2008 R2 (SP1)

Windows 8 (Enterprise and Pro) has been tested using 32-bit (x86) and 64-bit (x64) systems.

Windows 7 (SP1) (Professional and Ultimate) has been tested using 32-bit (x86) and 64-bit (x64) systems.

Windows Vista (SP2) (Business and Ultimate) has been tested using 32-bit (x86) and 64-bit (x64) systems.

Windows XP is not supported on 64-bit (x64) systems.

(Includes disk space for Opera Client installation and Microsoft .Net Framework v2.

### *Appendix 99: Pegasus Opera 3 – Purchasing*

The screenshot shows the Pegasus Opera 3 website. At the top, there's a navigation bar with links for Special Offers, NEW Blog, and social media icons (RSS, Google+, Facebook, Twitter, LinkedIn). A search bar is also present. Below the header, the Pegasus logo is displayed next to the word "pegasus". The main menu includes Software, Industries, Partners, About Us, Media, Events, Shop, and Contact Us. On the left, a sidebar titled "Software" lists various modules: Software Overview, Solutions Overview, Opera 3, Opera 3 SQL, Latest Release, Opera 3 video, Pegasus Business Cloud, Financials & Supply Chain, Payroll & HR, CRM, Document Management, and Reporting. The main content area features a section titled "Opera 3. One System. One Solution." which describes the software as a unified accounting and business solution. It highlights flexibility and customization options. Below this, there are two tabs: "Summary" and "Features". The "Summary" tab contains a brief description of the software's capabilities for different business roles. The "Features" tab lists specific requirements from various management roles: Finance Manager, Logistics Manager, MD, Sales Manager, Payroll Clerk, and Service Manager.

**Software**

- Software Overview
- Solutions Overview
- Opera 3
- Opera 3 SQL
- Latest Release
- Opera 3 video
- Pegasus Business Cloud
- Financials & Supply Chain
- Payroll & HR
- CRM
- Document Management
- Reporting

**Opera 3. One System. One Solution.**

Opera 3 is an accounting and business solution that can be fully integrated throughout your business for a unified view, eliminating the need for separate finance, payroll, CRM, supply chain or service systems.

Flexibility comes as standard. Its application features and customisation, configuration and setup options allow you to build the specific solution you need to suit your particular business. It means you can buy what you need, when you need it, and expand the solution as your business grows.

Summary	Features
It's for everyone in your business, for Accounts, Sales, Payroll and much more.	<ul style="list-style-type: none"><li>Finance Manager "How can I manage my cash flow effectively?" with Financials</li><li>Logistics Manager "How can I save time and money and reduce my paper trail?" with Supply Chain Management</li><li>MD "Tell me what I need to know without telling me everything." with Business Intelligence</li><li>Sales Manager "I want my system to share key information across all departments." with CRM</li><li>Payroll Clerk "I need a payroll system that will take the stress out of my payroll processes." with Payroll &amp; HR</li><li>Service Manager "To retain customers, I need to provide excellent after-sales care." with Service &amp; Helpdesk Management</li></ul>

Appendix 100: Pegasus Opera 3 – Software Distribution

## Web Development – Appendices

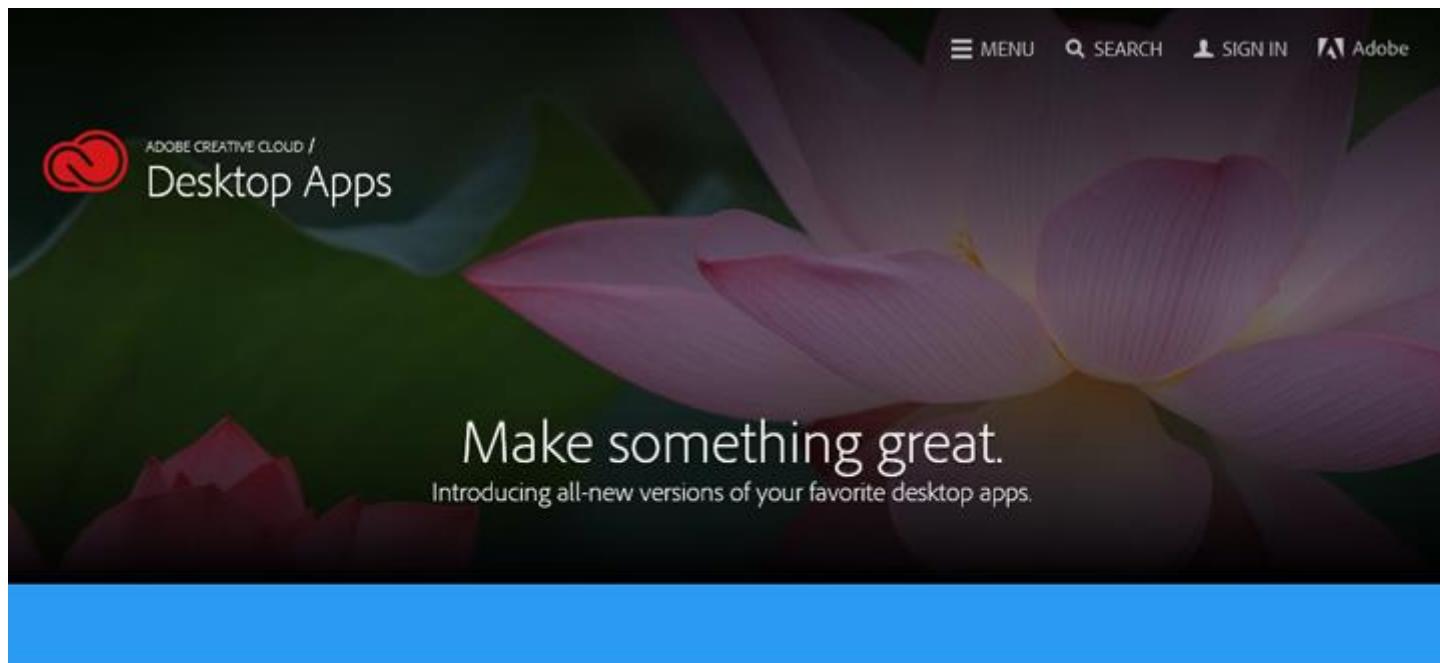
All information relating to Adobe Dreamweaver CC:

### *Appendix 101: Dreamweaver CC – Installation Guide Appendix*

Download your first app

Welcome to Creative Cloud! To get started, simply download your first app from the Adobe website. The Adobe Creative Cloud desktop app—which you'll use to manage future downloads—is installed at the same time.

1. Go to the [Creative Cloud apps catalog](#). Find an app that you want to download, such as Photoshop.



Note:

If you have a free trial subscription to Creative Cloud, refer to the [Creative Cloud trial instructions](#).

Don't have a Creative Cloud membership or trial yet? See [Get started with Creative Cloud](#).

2. Click **Download** to install the app you want. If you are not signed in, you are asked to sign in with your [Adobe ID](#) and password. Follow the onscreen instructions.

Your app begins to download.

At the same time, the Creative Cloud desktop app appears, and it manages the rest of the installation process. Check your download progress in the status bar next to the app's name.

Note:

Depending on your network's speed, it could take some time to download your app.

The screenshot shows the Adobe Creative Cloud desktop application interface. At the top, there's a navigation bar with 'MENU', 'SEARCH', and a user icon. Below it, a large banner says 'Photoshop is downloading now.' with a progress bar indicating 4%. The main area has tabs for 'Home', 'Apps' (which is selected), 'Assets', 'Stock', and 'Community'. Under 'INSTALLED (1)', it lists 'Photoshop CC (2015)' with a progress bar at 4%, followed by 'More Information' and an 'Install' button. Below this, under 'FIND ADDITIONAL APPS', there's a list of other CC 2015 apps with their own 'Install' buttons: Lightroom CC (2015), Illustrator CC (2015), InDesign CC (2015), Premiere Pro CC (2015), After Effects CC (2015), and Dreamweaver CC (2015). Each app entry includes its logo, name, 'More Information' link, and an 'Install' button.

Keep learning

Whether you're new or a pro, we're always making Photoshop better.  
Learn more with these tutorials.

GET STARTED  
How to edit a photo in Photoshop  
Project: 19 min

LEARN ESSENTIALS  
How to adjust perspective in a photo  
Video: 7 min

KEY TECHNIQUE  
How to work with Photoshop  
Video:

Get support

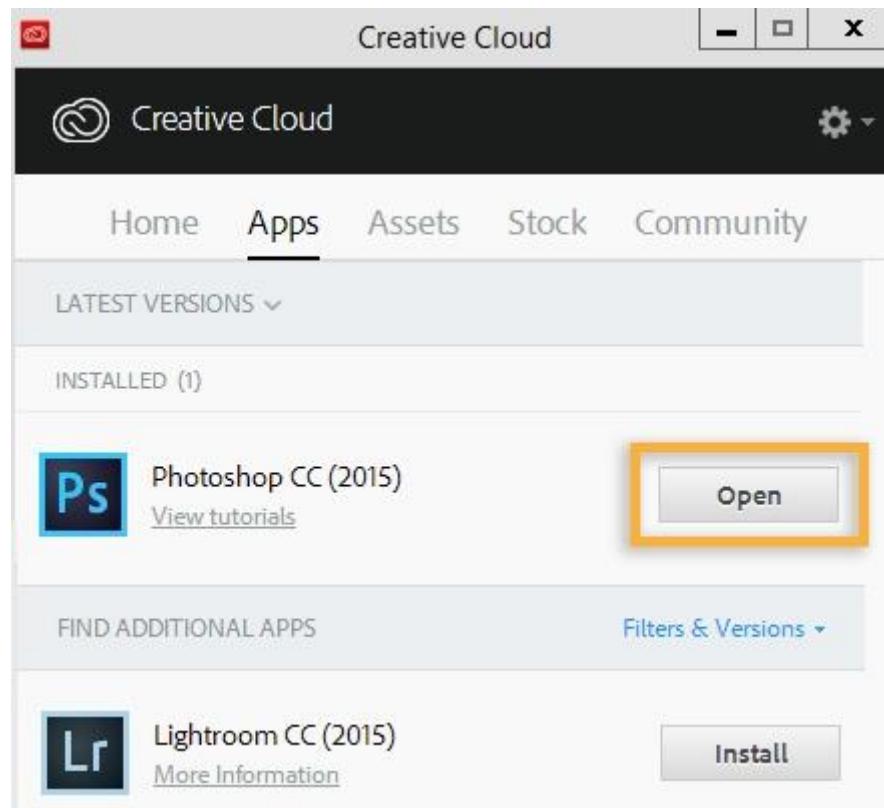
Have any questions? Visit the [Learn & Support area](#) for help.

3. To launch your new app, find the application's icon in the Apps panel and click **Open**.

You can also launch your new app the same way you normally launch any app on your computer. Your new app is installed in the same location where your applications are normally installed, such as the Program Files folder (Windows) or the Applications folder (Mac OS).

Tip:

Having trouble with your first download? See [Creative Cloud download and installation troubleshooting](#).



#### Download more apps

Once you've downloaded your first app, you can use the Creative Cloud desktop app to easily browse, install, launch, and manage any Creative Cloud app or service.

#### Tip:

To download mobile apps on your mobile device, visit the [Mobile apps catalog](#).

1. Click the **Creative Cloud icon**, located in the taskbar (Windows) or Apple menu bar (Mac OS), to open the Creative Cloud desktop app. If it's not already selected, click the **Apps** tab at the top of the window.

You will see your installed app, as well as a list of apps you can browse and install.

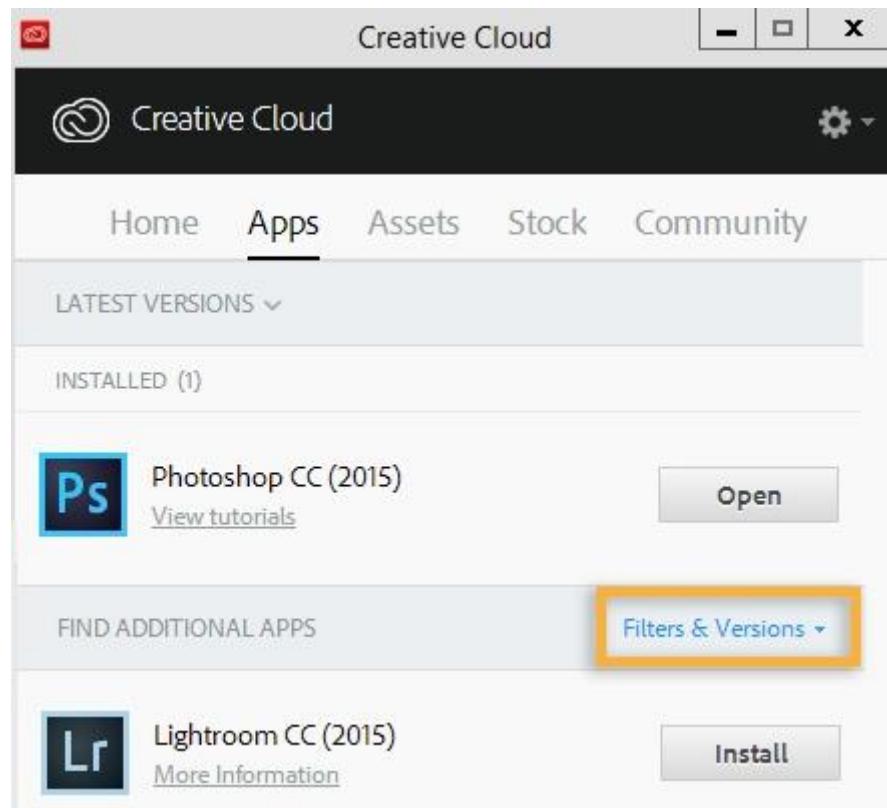
Tip:

If you don't see the Creative Cloud icon, you may have quit the application. You can relaunch it:

- Windows: Choose Start > Programs > Adobe Creative Cloud.
- Mac OS: Choose Go > Applications > Adobe Creative Cloud > Adobe Creative Cloud.

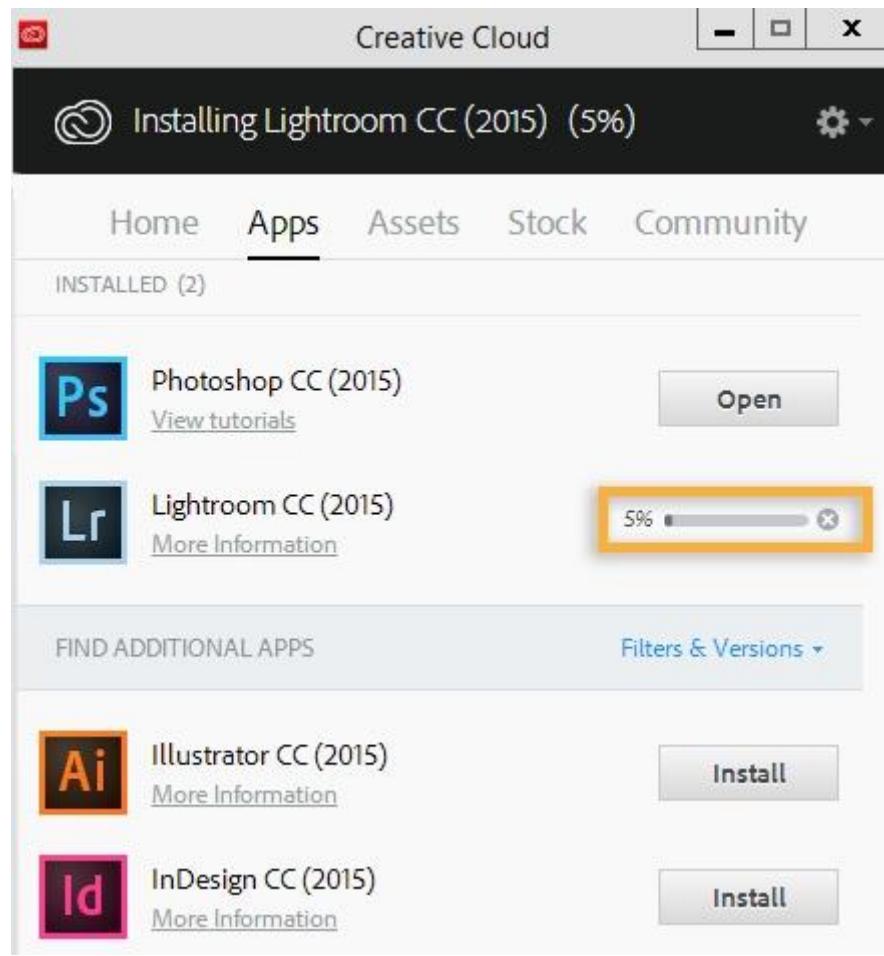
To download the Creative Cloud desktop app manually, visit the [Creative Cloud desktop app](#) page.

2. In the Find Additional Apps section, scroll to find the app you want to install. To filter the app list, click **Filters & Versions**.



3. Click **Install**.

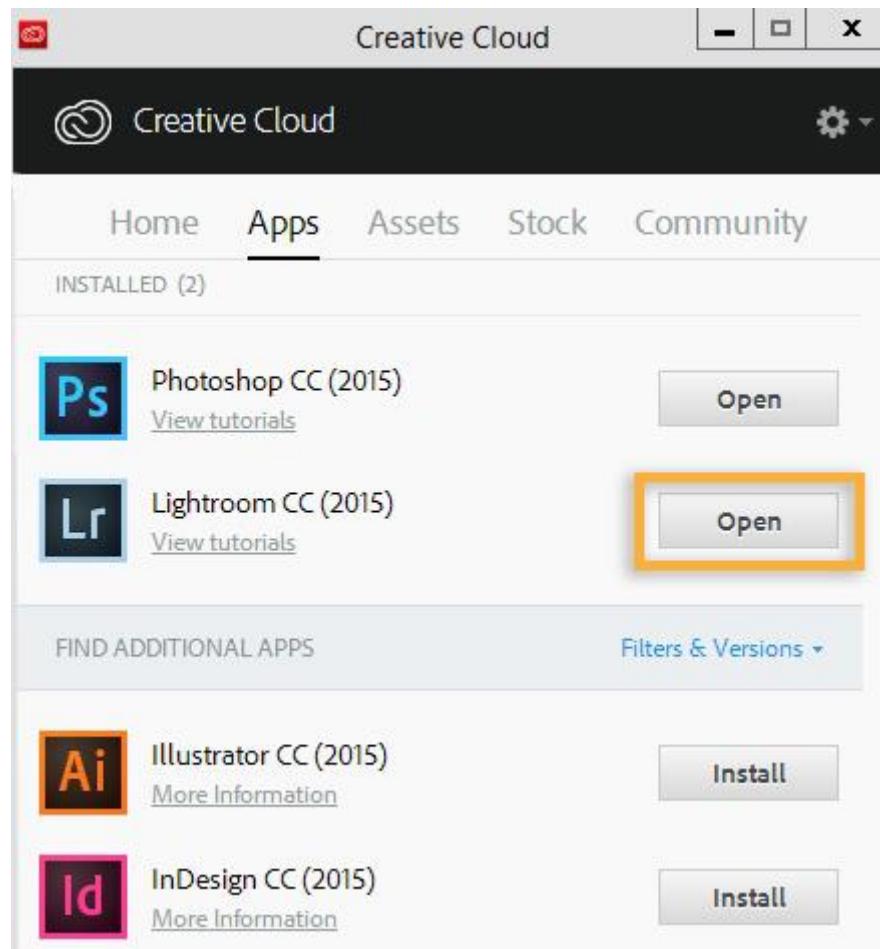
Your app will begin to download. Check your download progress in the status bar next to the app's name.



Note:

Depending on your network's download speed, it could take some time to download your app.

4. To launch your new app, find the application's icon and click **Open**.



Your new app is installed on your computer in the same location where your applications are normally installed, such as the Program Files folder (Windows) or the Applications folder (Mac OS). You can access it the same way you access any application on your computer.

*Appendix 102: Dreamweaver CC – System Requirements Appendix*

**Dreamweaver CC (2015, 2015.1, and 2015.2) system requirements**

**Windows**

- Intel Pentium 4 or AMD Athlon 64 processor
- Microsoft Windows 7, Windows 8, Windows 8.1, or Windows 10
- 2 GB of RAM
- 1.1 GB of available hard-disk space for installation; additional free space required during installation (cannot install on removable flash storage devices)
- 1280x1024 display with 16-bit video card
- Internet connection and registration are necessary for required software activation, validation of subscriptions, and access to online services.

## Appendix 103: Dreamweaver CC – Purchasing

[« Back](#)

### Select the plans you want

Then tell us how many licenses you'd like. You can always add more later.

Start    Select Plans    Checkout    Assign

The screenshot shows the Adobe Select Plans interface. On the left, a list of Creative Cloud applications is displayed with their respective icons, names, descriptions, monthly prices, and license types. Dreamweaver CC is selected, indicated by a checkmark next to its row. On the right, a summary box titled 'You've selected:' shows the chosen plan (Dreamweaver CC), its price (£22.23/month per license), quantity (1), and subtotal (£22.23 / mo excluding VAT). A dropdown menu shows 'Annual plan, paid monthly' is selected. A blue 'BUY NOW' button is at the bottom of the summary box.

Application	Description	Price	License Type
Acrobat Pro DC	Get the complete PDF solution for working anywhere.	£11.11	/mo per license
Adobe Muse CC	Website design without coding.	£22.23	/mo per license
Dreamweaver CC	Website and mobile app design.	£22.23	/mo per license
Animate CC	(Formerly Flash Professional) Interactive animations for multiple platforms.	£22.23	/mo per license
Premiere Pro CC	Video production and editing.	£22.23	/mo per license
After Effects CC	Cinematic visual effects and motion graphics.	£22.23	/mo per license
Adobe Audition CC	Sound your best.	£22.23	/mo per license
InCopy CC	Collaborate in demanding editorial workflows.	£22.23	/mo per license

## Business Email – Appendices

All information regarding Outlook:

### *Appendix 104: Microsoft Outlook – Configuring Email*

20th Mar, 2011., by [dxadmin](#), [Leave a comment](#)

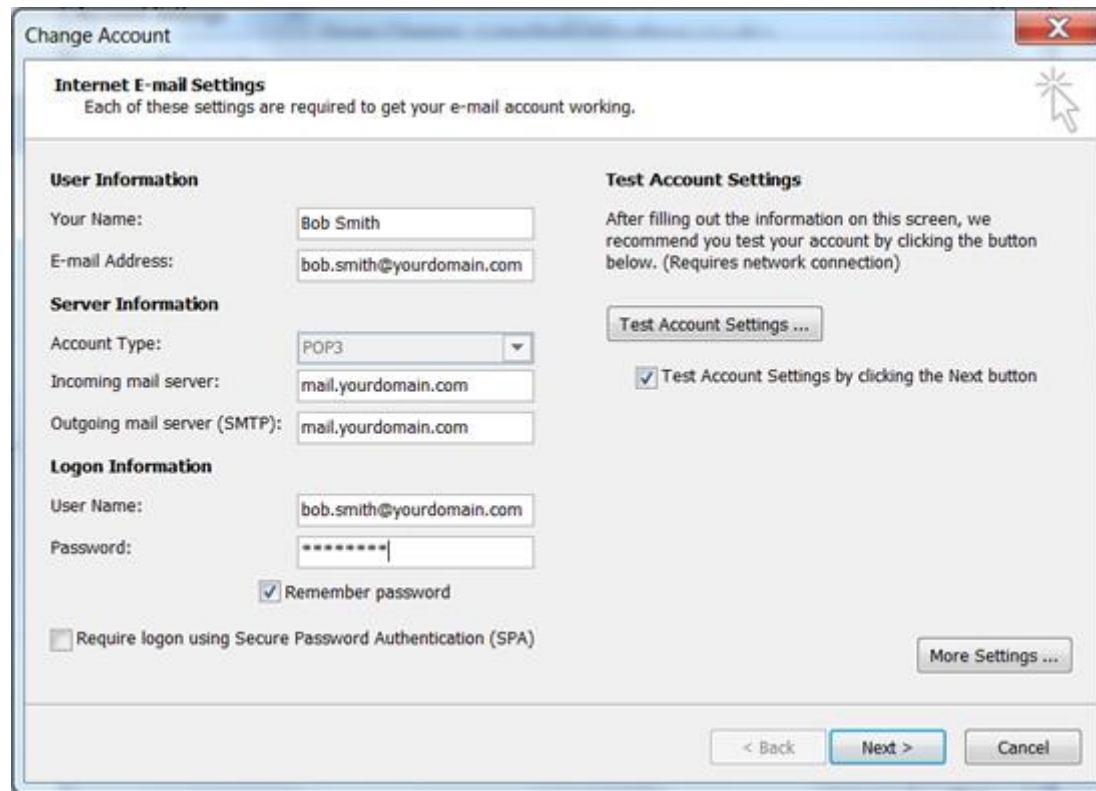
The steps below are based on Microsoft Outlook 2007. The core settings are largely the same throughout most modern email clients, it is likely to be the naming of menu items such as “Tools > Account Settings” in step one which is likely to vary.

**1. Tools > Account Settings**

**2. New**

3. Leave the first radio button checked (mentions POP amongst others) > Next

4. Check box at bottom: “Manually configure server settings...” > Next



5. Leave first radio button checked (mentions POP amongst others) > Next

#### 6. User Information:

- Your name: The name you'd like your emails to appear under in recipients' inboxes (E.g. Bob Smith/My Company Ltd).
- Email address: {EMAIL ADDRESS GOES HERE}

#### 7. Server Information:

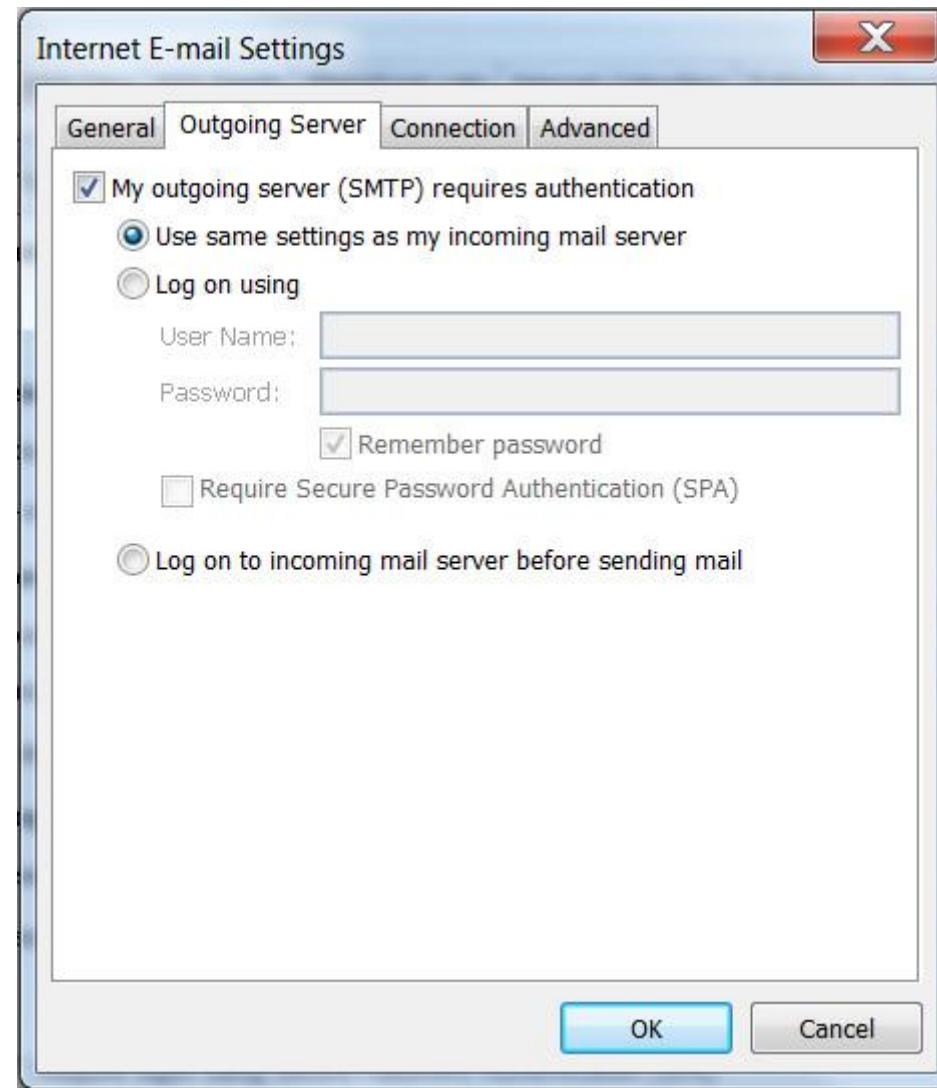
- Account type: POP3

- Incoming mail server: mail.yourdomain.com
- Outgoing mail server: mail.yourdomain.com

**8. Logon Information:**

- Username: {EMAIL ADDRESS GOES HERE}
- Password: {PASSWORD GOES HERE}
- Tick box “Remember Password”

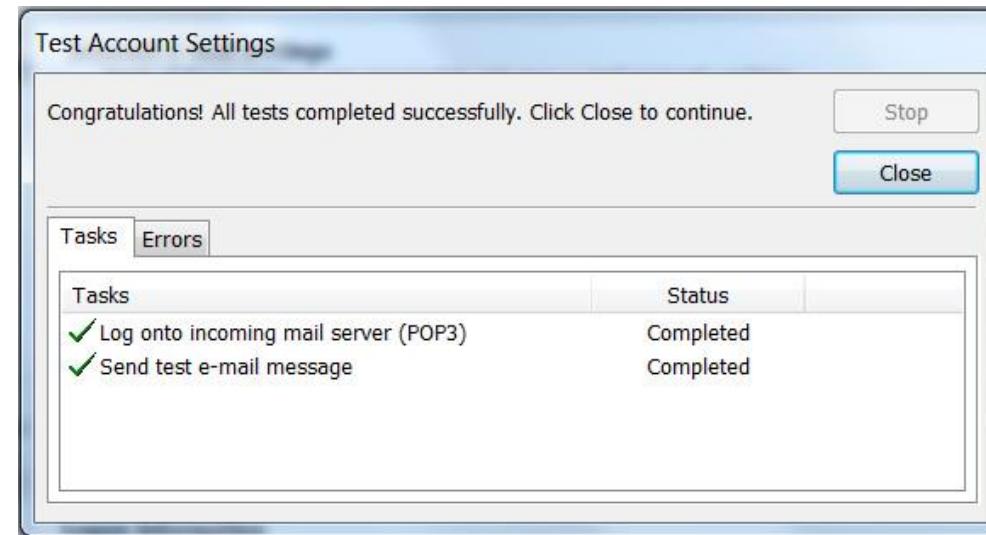
**9. Click button “More Settings”**



10. Move to “Outgoing Server” tab

11. Tick box “My outgoing mail server requires authentication” > Check radio button “Use same settings as my incoming mail server”.

12. You should now be setup to use Outlook – if you see a “Test Account Settings” option, click the button – you should get a list of green ticks if you have configured Outlook correctly.



## Appendix 105: Microsoft Outlook – Purchasing

The screenshot shows the Microsoft Office website with the Outlook product highlighted. The main headline reads: "Outlook 2016—get it now with an Office 365 subscription." Below the headline are two buttons: "Buy now" (in green) and "Try for free". To the right, there is a large image of the Microsoft Outlook application interface, showing an inbox with several messages and attachments. At the bottom of the page, there is a call-to-action button: "Sign in to Outlook.com".

## Anti-Virus – Appendices

All Norton related information:

### *Appendix 106: Norton Anti-Virus – Installation*

Installing a Norton product on your device

To get the best out of Norton Small Business, you need to install Norton security products that came with your subscription on all your devices. As an account owner, you can send invites to your employees to install Norton product on their devices too.

If you are a Norton Small Business owner and you purchased Norton Small Business from your service provider, you do not have to create a separate administrator account. If your service provider is enabled for single sign-on, you can conveniently access your Norton account using your service provider credentials.

You can install the Norton product on the current device or send an invite to get it installed on another device. In either case, the device gets automatically added to your Norton Small Business account after successful installation. Norton Small Business offers you the right product to install based on the operating system of the Sending invites to your employees' device. So, you need not worry about which product to choose for your device.

To install a Norton security product on the current device

- 1 Sign in to your service provider's website.
- 2 Click Norton Small Business.
- 3 In the page that appears, click **Download Norton**.
- 4 Click **Install on this device** tab and then click **Agree & Download**.
- 5 Run the downloaded file and follow the on-screen instructions.

To install a Norton security product on another device

- 1 Sign in to your service provider's website.

- 2 Click Norton Small Business.
- 3 In the page that appears, click **Download Norton**.
- 4 Click **Install on another device** tab.
- 5 Enter the email address that you can access on the device in which you want to install the product.
- 6 Click the send icon.

Norton sends an email with instructions, specific to your platform, for installing the Norton security product.

- 7 Open the email that you received, click the **Install Norton** link, and follow the on-screen instructions.

### *Appendix 107: Norton Anti-Virus – System Requirements Appendix*

#### **Cloud-Managed Service**

#### **Desktop Editions**

#### **Operating Systems**

- Microsoft® Windows® XP (32-bit) Home/Professional/Tablet PC/Media Center (32-bit) with Service Pack 2 or later
- Microsoft Windows Vista® (32-bit and 64-bit) Starter/Home Basic/Home Premium/Business/Ultimate with Service Pack 1 or later
- Microsoft Windows 7 (32-bit and 64-bit) Starter/Home Basic/Home Premium/Professional/Ultimate
- Microsoft Windows 8, Windows 8 Pro, Windows 8.1 (32-bit and 64-bit), Windows 10

#### **Hardware**

- 300 MHz for Windows XP, 1 GHz for Windows Vista/ Windows 7/ Windows 8/ Windows 8.1

- 256 MB of RAM
- 300 MB of available hard disk space
- CD-ROM or DVD drive (if not installing via electronic download)

**Servers:**

**Operating System**

- Windows Server 2003 (32-bit, 64-bit, R2, SP1 or later)
- Windows Small Business Server 2003 (32-bit)
- Windows Server 2008 (32-bit, 64-bit, R2, SP1, and SP2)
- Windows Small Business Server 2008 (64-bit)
- Windows Small Business Server 2011 (64-bit)
- Windows Essential Business Server 2008 (64-bit)
- Windows Server 2012 R2

**Hardware**

- 32-bit processor for Windows: 1-GHz Intel Pentium III or equivalent minimum (Intel Pentium 4 or equivalent recommended)
- 64-bit processor for Windows: 2-GHz Pentium 4 with x86-64 support or equivalent minimum. Itanium processors are not supported.
- 512 MB (1 GB recommended) of RAM, or higher if required by the operating system
- Hard disk: 700 MB or more free space

**On Premise Management Option**

#### **Desktops and Servers:**

- Windows Server 2012, Windows Server 2012 R2
- Windows 8, Windows 8.1 (32-bit, 64-bit)
- Windows XP Home or Professional (32-bit, SP2 or later; 64-bit, all SPs)
- Windows XP Embedded (SP3 and later)
- Windows Vista (32-bit, 64-bit)
- Windows 7 (32-bit, 64-bit, RTM, and SP1)
- Windows Embedded Standard 7
- Windows Server 2003 (32-bit, 64-bit, R2, SP1 or later)
- Windows Small Business Server 2003 (32-bit)
- Windows Server 2008 (32-bit, 64-bit, R2, SP1, and SP2)
- Windows Small Business Server 2008 (64-bit)
- Windows Essential Business Server 2008 (64-bit)
- Windows Small Business Server 2011 (64-bit)

#### **Hardware**

- 32-bit processor for Windows: 1-GHz Intel Pentium III or equivalent minimum (Intel Pentium 4 or equivalent recommended)
- 32-bit processor for Mac: Intel Core Solo, Intel Core Duo. PowerPC processors are not supported.
- 64-bit processor for Windows: 2-GHz Pentium 4 with x86-64 support or equivalent minimum. Itanium processors are not supported.

- 64-bit processor for Mac: Intel Core 2 Duo, Intel Quad-Core Xeon
- 512 MB of RAM (1 GB recommended), or higher if required by the operating system
- Hard disk: 700 MB or more free space

**Mac:**

- Mac OS X 10.6.8, 10.7, 10.8
- Mac OS X Server 10.6.8, 10.7, 10.8, 10.9

**Management Server:**

**Operating Systems**

- Windows Server 2012, Server 2012 R2
- Windows 8, 8.1 (32-bit, 64-bit)
- Windows 7 (32-bit, 64-bit, RTM and SP1; all editions except Home)
- Windows XP Professional (32-bit, SP3 or later; 64-bit, all SPs)
- Windows Server 2003 (32-bit, 64-bit, R2, SP1 or later)
- Windows Small Business Server 2003 (32-bit)
- Windows Server 2008 (32-bit, 64-bit, R2, RTM, SP1, and SP2)
- Windows Small Business Server 2008 (64-bit)
- Windows Essential Business Server 2008 (64-bit)
- Windows Small Business Server 2011 (64-bit)

## Hardware

- 32-bit processor: 1-GHz Intel Pentium III or equivalent minimum (Intel Pentium 4 or equivalent recommended)
- 64-bit processor: 2-GHz Pentium 4 with x86-64 support or equivalent minimum
- 1 GB of RAM for 32-bit operating systems, 2 GB of RAM for 64-bit operating systems, or higher if required by the operating system
- Hard drive: 4 GB or free space for the server, plus 4 GB for locally installed database system

## *Appendix 108: Norton Anti-Virus – Deployment Appendix*

Table: Steps for installing the client software by using Active Directory Group Policy Object

Step	Action
Step 1	<p>Export the managed client installation package with the option <b>Separate files (required for .MSI)</b>.</p> <p>See <a href="#">Installing clients with Save Package</a>.</p>
Step 2	<p>Stage the folder of installation files. For example, copy the managed client installation package into a shared folder on which you have set the correct permissions to allow access.</p>
Step 3	<p>Create a GPO software distribution.</p> <p>You should also test GPO installation with a small number of computers before the production deployment. If you do not configure DNS properly, GPO installations can take an hour or more.</p> <p>See <a href="#">Creating a GPO software distribution</a>.</p>

Step	Action
Step 4	<p>Add computers to the organizational unit.</p> <p>See Adding computers to an organizational unit to install software.</p>

### Appendix 109: Norton Anti-Virus – Purchasing

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5 devices 10 devices 20 devices

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20 devices  
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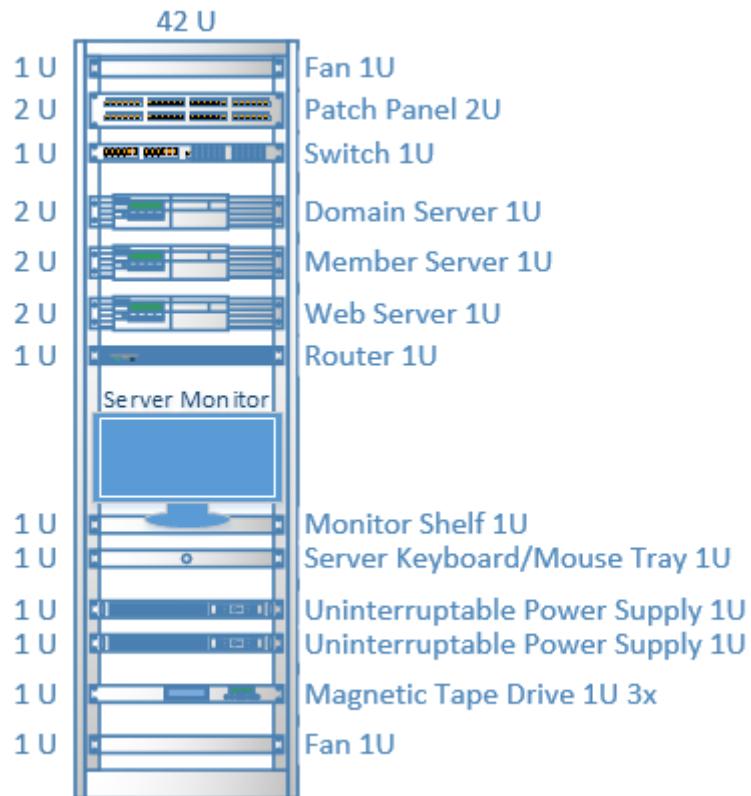
[+] Feedback

<http://buy.norton.com/estore/mf/cart>

## Installation and configuration of network nodes – Appendices

### General Network Nodes Appendices

#### Appendix 110: Main Distribution Frame



## Appendix 111: IP Configuration Scheme

Devices	Number of Hosts	IP Addresses
Router	1	172.20.0.1 (Static)
Domain Server	1	172.20.0.2 (Static)
Member Server	1	172.20.0.3 (Static)
Web Server	1	172.20.0.4 (Static)
Spare Printer	1	172.20.0.11 (Static)
Purchasing Printer	1	172.20.0.12 (Static)
Sales Printer	1	172.20.0.13 (Static)
Accounts Printer	1	172.20.0.14 (Static)
MD Printer	1	172.20.0.15 (Static)
Receptionist Printer	1	172.20.0.16 (Static)
Purchasing Clients	7	172.20.0.21-172.20.0.60 (DHCP)
Sales Clients	6	172.20.0.21-172.20.0.60 (DHCP)
Accounts Clients	5	172.20.0.21-172.20.0.60 (DHCP)
MD Client	1	172.20.0.21-172.20.0.60 (DHCP)
Receptionist Client	1	172.20.0.21-172.20.0.60 (DHCP)

## Server Appendices

### Appendix 112: DELL PowerEdge R330 rack server

PowerEdge R330 rack server

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## Appendix 113: Physical Installation of Rack Equipment

### Rack installation instructions

Review the documentation that comes with the rack cabinet for safety and cabling information. Before you install the server in a rack cabinet, review the following guidelines:

- Two or more people are required to install devices 2U or larger in a rack cabinet.
- Make sure that the room air temperature is below 35°C (95°F).
- Do not block any air vents; usually 15 cm (6 in.) of space provides proper airflow.
- Do not leave open spaces above or below an installed server in your rack cabinet. To help prevent damage to server components, always install a blank filler panel to cover the open space and to help ensure proper air circulation.
- Install the server only in a rack cabinet with perforated doors.
- Plan the device installation starting from the bottom of the rack cabinet.
- Install the heaviest device in the bottom of the rack cabinet.
- Always install the tip plates on the rack.
- Do not extend more than one device out of the rack cabinet at the same time.
- Remove the rack doors and side panels to provide easier access during installation.
- Connect the server to a properly grounded outlet.
- Do not overload the power outlet when you install multiple devices in the rack cabinet.
- Install the server in a rack that meets the following requirements:
  - Minimum depth of 70 mm (2.76 in.) between the front mounting flange and inside of the front door.
  - Minimum depth of 157 mm (6.18 in.) between the rear mounting flange and inside of the rear door.
  - Minimum depth of 718 mm (28.27 in.) and maximum depth of 762 mm (30 in.) between the front and rear mounting flanges to support the use of the cable-management arm.
  - Maximum thickness of 4.65 mm (0.18 in.) of the rack mounting flanges
  - Nominal square hole dimension of 9.5 mm (0.375 in.) for racks with square mounting holes
  - Nominal round hole diameter of 7.1 mm (0.28 in.) for racks with round mounting holes
- Racks with threaded mounting holes are not supported with these slide rails.

**Statement 4:**



**Caution:** Use safe practices when lifting.



≥18 kg (39.7 lb)



≥32 kg (70.5 lb)



≥55 kg (121.2 lb)

**Statement 26:**



**Caution:** Do not place any objects  
on top of rack-mounted devices.

**Statement 36:**



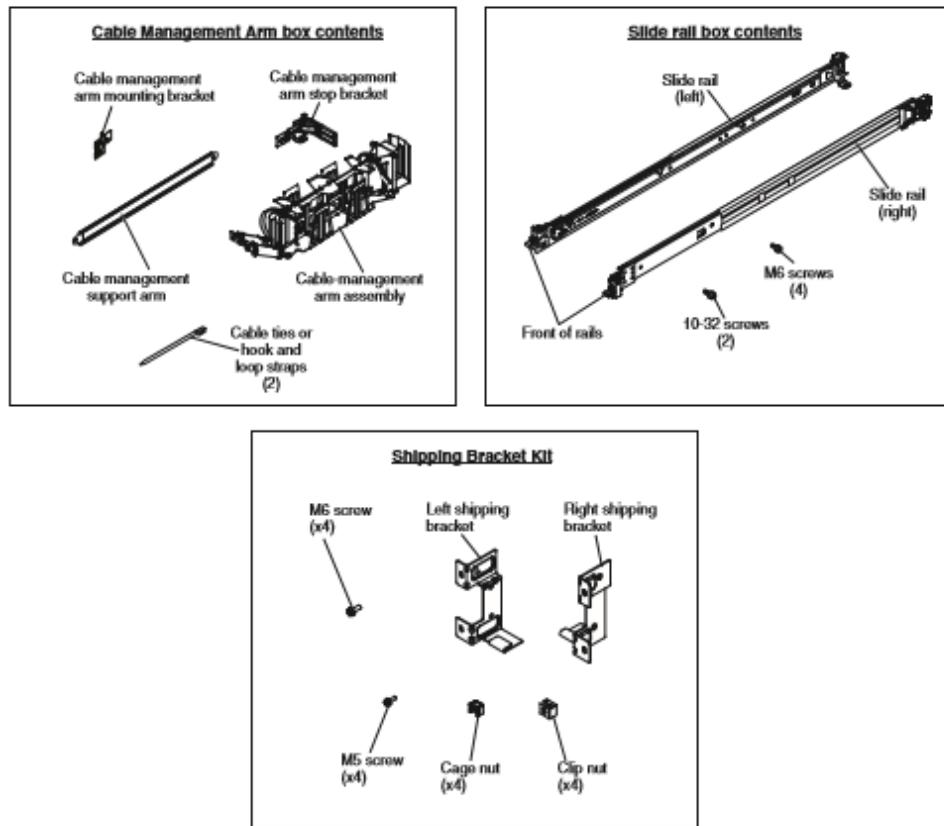
**Caution:** Always install the slide retention screw.

**Notes:**

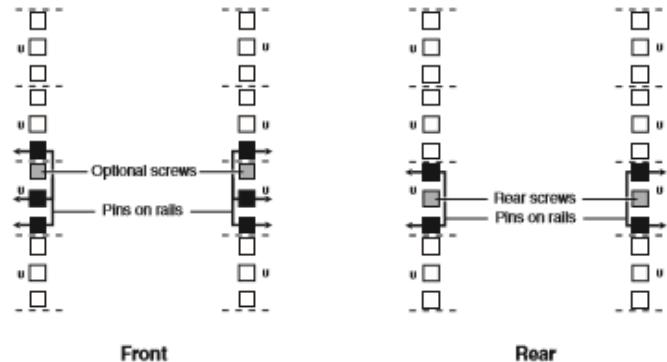
1. If you are scaling this server as part of a multinode system, see the rack installation instructions that come with the option kit for instructions on installing the extra hardware required in the multinode setup.
2. You can install the cable-management arm on either side of the server. The installation instructions in this document can be reversed if you are installing the cable-management arm on the side of the server that is not shown.

The following illustration shows the items that you need to install the server in the rack cabinet. If any items are missing or damaged, contact your place of purchase.

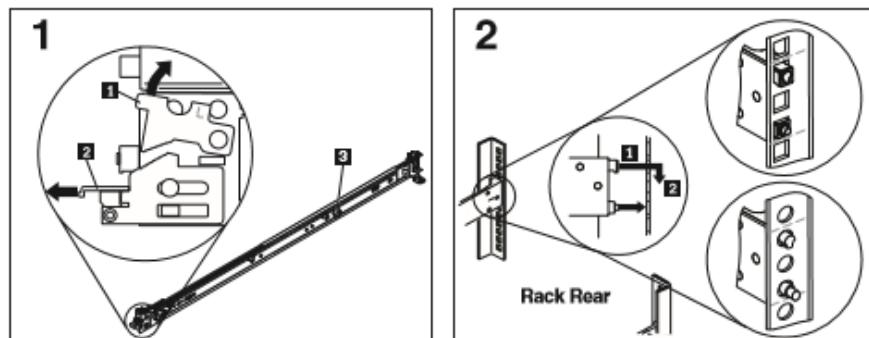
Note: Some items come with the server, not in the rack installation kit.



Use the following illustration of the front and rear rack-mounting flanges to determine the appropriate rack-mounting holes for installing the slide rails.



Note: If the slide rails in your rack installation kit came with shipping thumbscrews, remove them before you begin the following installation procedure.



**Open the front slide rail latches.**

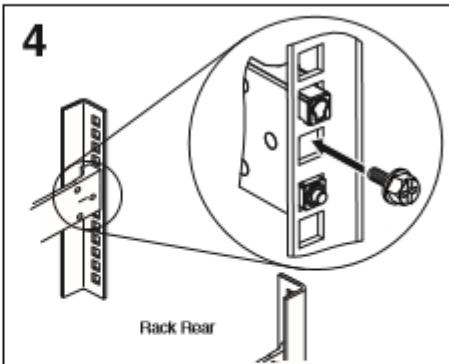
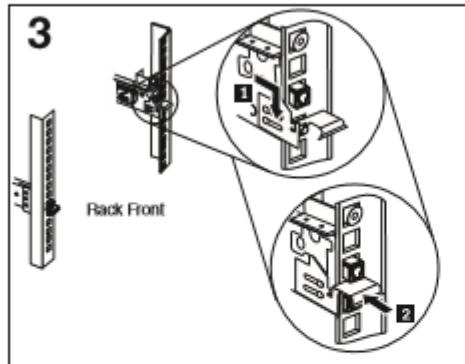
Each slide rail is marked with either an R (right) or an L (left). Select one of the slide rails and push up on the front moveable tab **1**; then, pull out the front latch **2**. If a thumbscrew is installed in the slide rail **3**, remove it.

**Install the rear end of the slide rails.**

Note: When you install a 4U server, be sure to install the slide rails in the second U from the bottom of the 4U area in the rack.

From the front of the rack, line up the three pins on the rear of the slide rail with the three holes in the selected U on the rear of the rack. Push the rails so that the pins go into the holes **1**, and drop the slide rail down **2** until it latches into place.

If there is a screw with a tag attached installed in the middle hole in the rear bracket, remove the tag and screw and keep the screw for a later step.



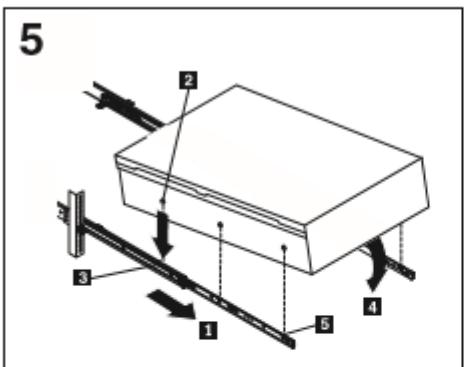
**Install the front end of the slide rails.**

Pull the slide rail forward and insert the two lower pins **1** on the front of the rail into the two lower holes in the U on the front of the rack. Drop the rail into place until it clicks. Push the front latch **2** in all the way with one hand while you pull on the rail assembly with your other hand. Make sure that the front of the rail flange is in contact with the EIA flange.

**Secure the server in the rear of the rack.**

Install the screws you removed in step two in the middle hole in the rear of the rack.

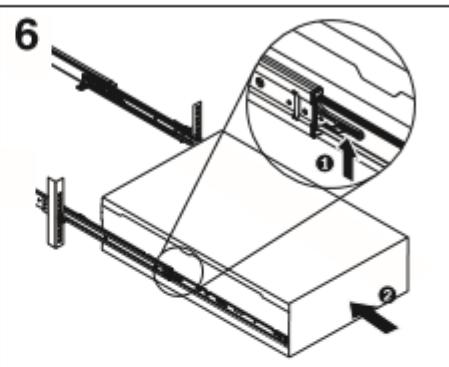
Repeat steps 1 through 4 to install the other rail into the rack. Make sure that each front latch is fully engaged.



**Install the server on the slide rails.**

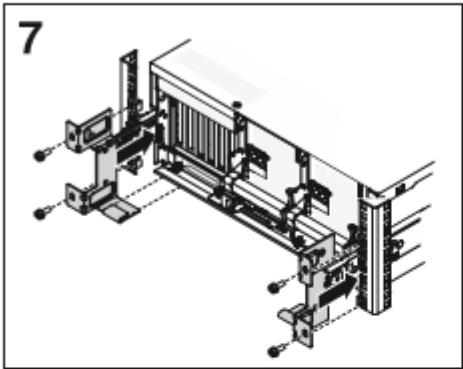
Pull the slide rails forward **1** until they click, two times, into place. Carefully lift the server and tilt it into position over the slide rails so that the rear nail heads **2** on the server line up with the rear slots **3** on the slide rails. Slide the server down until the rear nail heads slip into the two rear slots, and then slowly lower the front of the server **4** until the other nail heads slip into the other slots on the slide rails. Make sure that the front latch **5** slides over the nail heads.

It is possible to install the server horizontally, but it is easier to install when the server is tilted.



**Slide the server into the rack.**

Lift the locking levers **1** on the slide rails and push the server **2** all the way into the rack until it clicks into place.

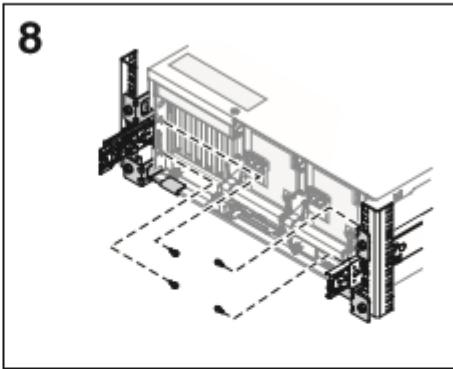


**7**

Install the shipping brackets on the rear of the server, if necessary. (If you are not installing shipping brackets, go to step 9.)

Note: If you plan to transport the rack cabinet to another location with the server installed, you must install the shipping brackets.

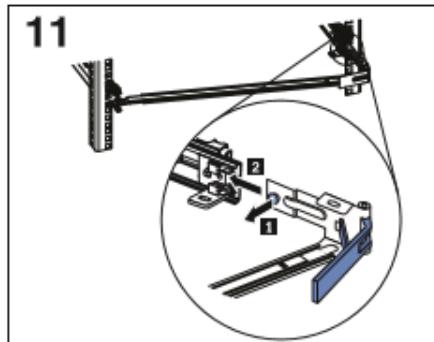
Install the cage nuts (square hole racks) or the clip nuts (round hole racks) on the rack, then slide the brackets into place as shown. Install the four M6 screws into the rear of the brackets.



**8**

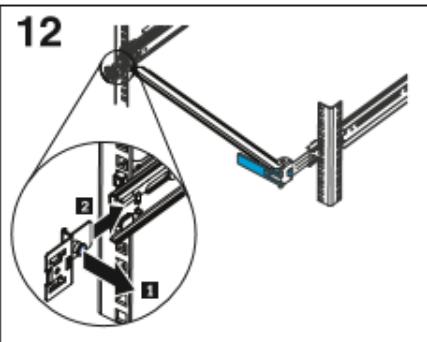
If you installed the shipping bracket, install the screws into the brackets.

Install the four M5 screws into the sides of the brackets.



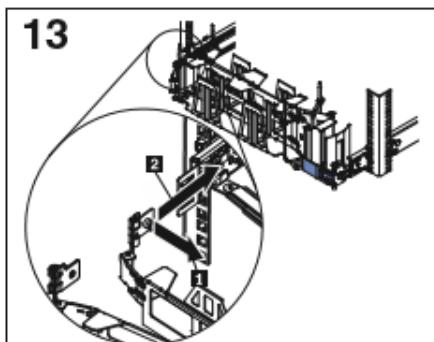
Connect the stop bracket to the slide rail.

To attach the other side of the support arm to the rear of the slide rail, pull the pin out **1**, and then slide the bracket **2** into the slide rail.



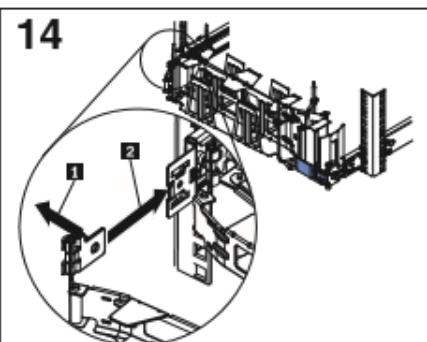
Install the cable management arm mounting bracket.

Pull out the mounting bracket pin **1** and slide the mounting bracket **2** into the slide rail onto which you are installing the cable-management arm. Push the bracket into the slide rail until the spring-loaded pin snaps into place.



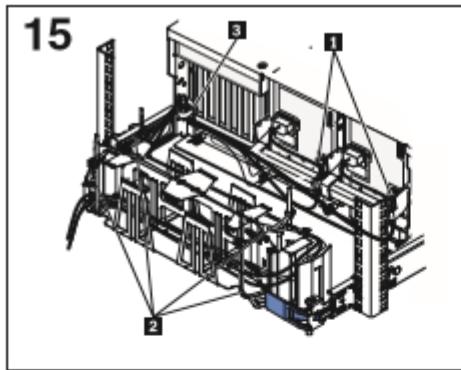
Install the cable management arm.

Place the cable-management arm on the support arm. Pull out the cable-management arm pin **1**, and then slide the cable-management arm tab **2** into the slot on the inside of the slide rail. Push the tab until it snaps into place.



Install the cable management arm.

Pull out the other cable-management arm pin **1**, and then slide that cable management arm tab into the slot **2** on the outside of the slide rail. Push the tab until it snaps into place.

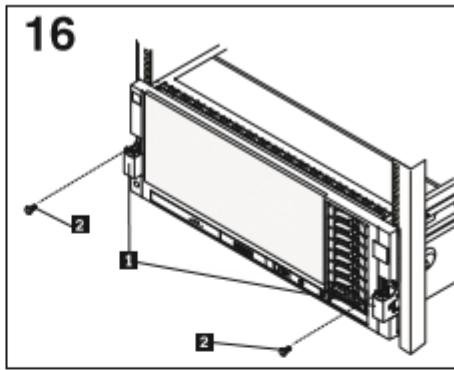


**15**  
Connect and route the cables.

Attach the power cords and other cables to the rear of the server (including keyboard, monitor, and mouse cables, if required). (To access the rear of the server, lift the cable management arm above the stop bracket and rotate it out of the way.)

Route the cables and power cords through the cable clamps **1** on the back of the power supplies, then route them in the cable-management arm **2** and secure them with cable ties or hook-and-loop fasteners. Thread a cable tie through the loop **3** on the rear of the server and secure the cables in place so that they do not drop below the cable management arm.

**Note:** Allow slack in all cables to avoid tension in the cables as the cable-management arm moves in the extended position.

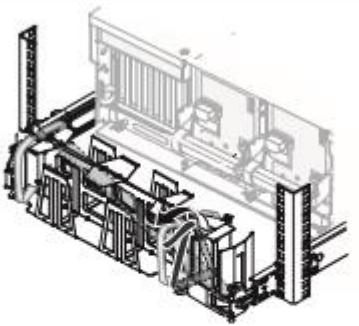


**16**  
Install the front screws, if necessary.

Slide the server into the rack until it snaps into place. To slide the server out of the rack, press on the release latches **1**.

**Note:** When you move the rack cabinet, or if you install the rack cabinet in a vibration-prone area, insert the optional M6 screws **2** in the front of the server.

**17**

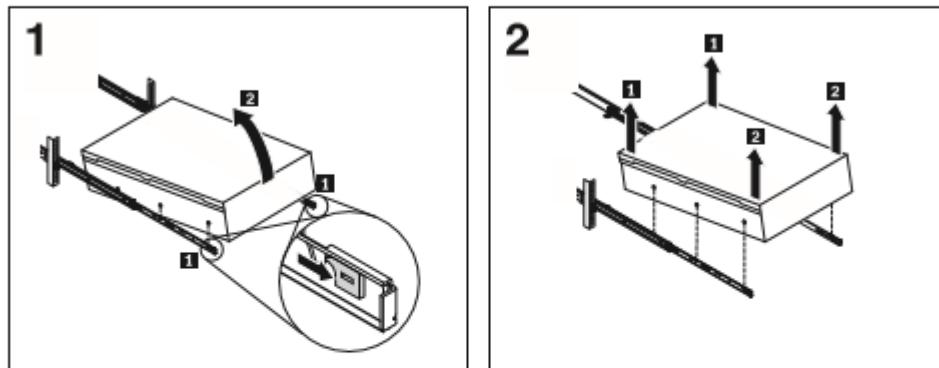


Secure the cable management arm if you are shipping the server in a rack.

If you are shipping the server in a rack, you must secure the cable management arm first.

Use a cable tie to secure the free end of the cable management arm to the cable management support arm.

### Removing the server from the rack



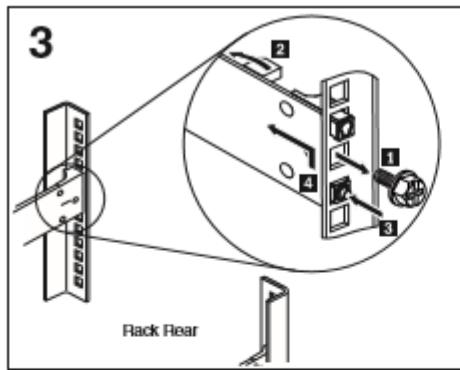
#### Unlatch and rotate the front of the server.

To remove the server from the rack, disconnect the cables from the rear of the server. Remove the cable management arm by pulling the pins out while sliding the tabs out of the mounting location. (If you installed shipping brackets on the server, you must also remove them now.)

Pull the locking levers [1] forward, while supporting the rear of the server, and lift the front of the server up slightly [2] to clear the nailhead from the slot.

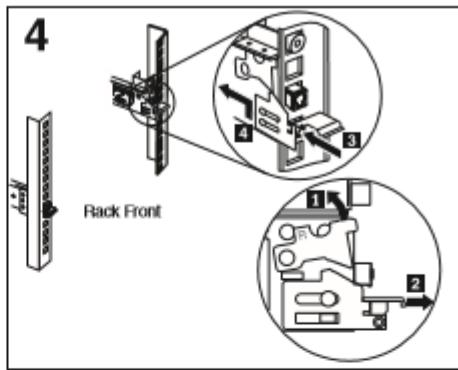
#### Lift the server off of the slide rails.

After the front nailheads clear the latches, lift up on the rear [1] of the server to level the server. Lift the server out of the rack [2] and place it on a sturdy surface.



**Remove the rear end of the slide rails.**

To disengage the slide rails from the rear of the rack, remove the retention screw **1** if one is installed, then rotate the latch **2** toward the front of the rack. Push the pin **3** in toward the rack, and then lift and push the end of the rail **4** toward the front of the rack.



**Remove the front end of the slide rails.**

To remove the slide rails from the front of the rack, push up the front tab **1** and slide out the front latch **2**. Push in the lower pin **3** and lift up slightly on the front of the slide rail **4**. Remove the slide rail from the rack.

Store this information with your server documentation for future use.

## Workstation Appendices

Workstation information:

### Appendix 114: Workstations

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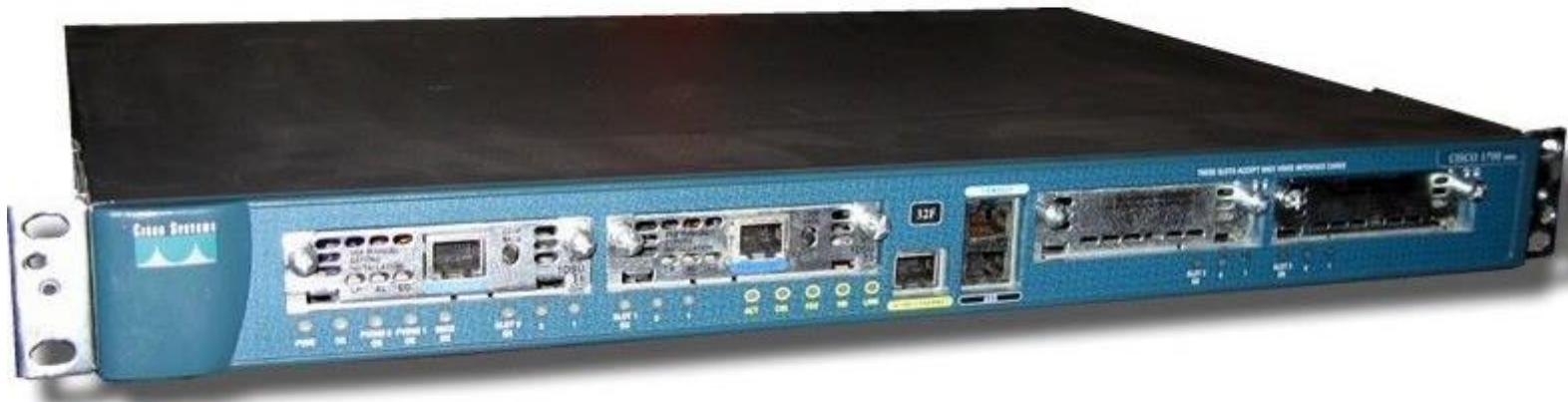
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may vary, [click](#) for more  
information.



## Routers, UPS, Switches and Cabling Appendices

Routers, UPS, Switches and cabling information:

Appendix 115: Router

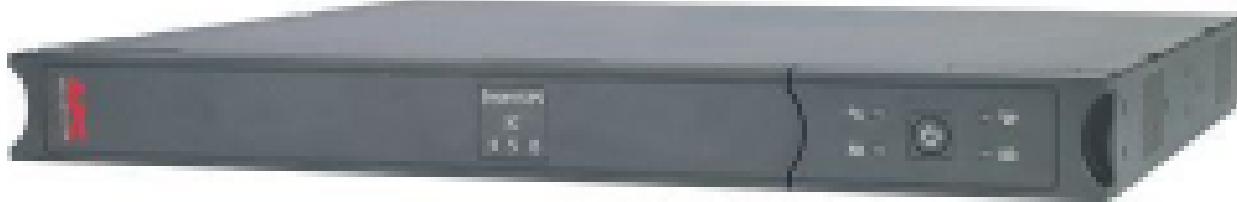


## Appendix 116: Packet Tracer Router Configuration

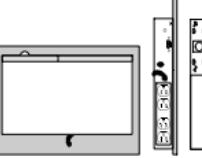
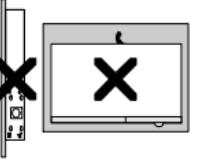
```
>enable
#config t
    #hostname memories
    #ena secret class
    #line con 0
    #password cisco
    #login
    #line vty 0 4
    #password cisco
    #login
    #exit

    #int s0/0
        #ip address (192.168.0.67) (255.255.255.252)
        (#clockrate 64000)
        #no shutdown
        #exit
    #int fa0/0
        #ip address (172.20.0.1) (255.255.255.192)
        #no shutdown
        #exit
    #router rip
        #network (172.20.0.1)
        #network (192.168.0.67)
        #exit
```

Appendix 117: Uninterruptable Power Supply: APC Smart-UPS SC 450VA 230V - 1U Rackmount/Tower

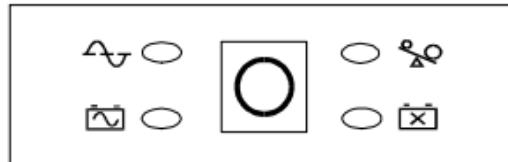


## Appendix 118: Uninterruptable Power Supply: Installation

<b>Installation</b> <p>To obtain warranty coverage, please fill out and return the warranty registration card now.</p> <b>Inspection</b> <p>Inspect the APC PowerStack 250/450 Uninterruptible Power Supply (UPS) upon receipt. Notify the carrier and dealer if there is damage. The packaging is recyclable; save it for reuse or dispose of it properly.</p> <b>Battery Connection</b> <p>Before beginning installation of the UPS, please follow the Battery Connection instructions on the front of the unit, or follow the steps under <i>Replacing the Battery Pack</i>.</p> <b>Placement</b> <p><b>Warning!</b> Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the warranty.</p> <b>Rack Mounting</b> <p>The UPS comes with standard 19" (46.5 cm) rack mount brackets. It is supplied with four (4) screws to attach the mounting brackets (ears) to the chassis. Select a rack location with adequate air flow that is free from excessive dust. Ensure that the air vents on the sides of the UPS are not blocked. Do not operate the UPS where temperature or humidity are outside the limits in the <i>Specifications</i> section of this manual.</p>	<b>Wall Mounting</b> <p>The brackets on the UPS can be rotated 90° for wall mounting. Remove the screws, rotate the brackets, and insert the screws in the appropriate holes.</p>  <p>Wall-mount the unit with the controls towards or at the top, not at the bottom of the unit.</p> <p>The illustrations above show the proper positions for wall mounting the unit</p>  <p><b>Warning!</b> Do not mount the unit on the wall as shown in the illustrations at left. Doing so could result in a safety hazard.</p> <b>Rear View</b>  <p>Once the UPS is mounted, please follow the installation instructions in the <i>Smart-UPS Quick Reference Guide</i>.</p>	<b>Desktop Use</b> <p>This UPS is provided with four adhesive-backed rubber "feet" for desktop use. Attach the feet to the bottom of the unit and remove the ears to use it on a desktop.</p> <p>The recommended placement of the feet is shown by a small + on the bottom corners of the unit:</p>  <p><b>Check the Site Wiring Fault Indicator</b> <b>Caution!</b> If the site wiring fault indicator lights, get a qualified electrician to correct the building wiring.</p> <p> <b>Computer Interface Port</b> The interface port is used for communicating with the UPS. See enclosed documentation for details.</p> <p><b>Connect the Battery Pack</b> The UPS is shipped with the battery pack disconnected. To connect the battery pack, follow the procedure in <i>Replacing the Battery Pack</i>, below.</p> <p> <b>Charge the battery pack</b> The UPS charges its battery pack whenever it is connected to utility power. The battery pack will charge fully during the first 4 hours of normal operation. Do not expect full battery back-up runtime during this initial charge period.</p>
---	---	---

## Operating Instructions

### Switch On — Switch Off



With the UPS plugged in, press and release the on/off/test button to supply power to the loads.

The loads are immediately powered while the UPS performs a self-test. Press and release the button again to turn off power to the loads. It may be convenient to use the UPS as a master on/off switch for the protected equipment.

The green on-line LED illuminates when the UPS is supplying utility power to the loads.

### Self-test

The UPS performs a self-test automatically when turned on, and every two weeks thereafter.

Automatic self-test eases maintenance requirements by eliminating the need for periodic manual self-tests.

During the self-test, the UPS briefly powers the loads on-battery. If the UPS passes the self-test, it returns to on-line operation.

If the UPS turns off during the self-test and emits a fading tone, the batteries are not connected properly.

The loads are not affected by a failed test. Recharge the battery pack overnight and perform the self-test again. If the replace battery LED is still on, replace the battery pack using the *Replacing the Battery Pack* procedure.

### On Battery

During on-battery operation, the yellow on-battery LED illuminates and the UPS sounds an audible alarm consisting of 4 beeps every 30 seconds. The alarm stops when the UPS returns to on-line operation.

### Low Battery

When the UPS is operating on-battery and the energy reserve of the battery pack runs low, the UPS beeps continuously until the UPS shuts down from battery pack exhaustion or returns to on-line operation, if the utility power returns before the battery pack is exhausted..

### Replace Battery

If the battery pack fails a self-test, the UPS emits short beeps for one minute and the red replace battery LED illuminates.

The UPS repeats the alarm every five hours. Perform the self-test procedure to confirm replace battery conditions. The alarm stops when the battery pack passes the self-test.

### Cold Start

**Note:** Cold start is not a normal operating condition.

When the UPS is off and there is no utility power, it is possible to cold start the UPS to power the loads from the UPS's battery pack.

Press and hold the on/off/test button until the UPS emits a constant tone.

Release the on/off/test button during the tone to start the UPS.

### Overload

When loads exceed the UPS's capacity, the red overload LED illuminates and the UPS emits a sustained tone. The alarm remains on until the overload is removed. Disconnect nonessential load equipment from the UPS to eliminate the overload.

If the overload is severe, the input circuit breaker may trip (the resettable center plunger of the circuit breaker pops out). Disconnect nonessential load equipment from the UPS to eliminate the overload and press the plunger back in.

If there is AC power and the circuit breaker does not trip during overload, the loads are still powered. If the circuit breaker trips or the UPS attempts to transfer to battery, the loads' power will be shut off. Turn the UPS off then back on to power the loads.

## Storage

### Storage Conditions

Before storing, charge the UPS for at least 8 hours. Cover the UPS and store it lying flat in a cool, dry location, with its battery pack fully charged.

### Extended Storage

At -15 to +30 °C (+5 to +86 °F), charge the UPS's battery pack every 6 months.

At +30 to +45 °C (+86 to +113 °F), charge the UPS's battery pack every 3 months.

## Replacing the Battery Pack

This UPS has an easy to replace hot-swappable battery pack.

**Note:** Please read the cautions in the *APC Safety Guide*.

### Replacement Batteries

See your dealer or call the number in this manual for information on replacement battery pack kits. For 250 models, order **RBC17**. For 450 models, order **RBC18**.

### Battery Pack Replacement Procedure

Battery pack replacement is a safe procedure, isolated from electrical hazards. You may leave the UPS and loads on for the following procedure.

#### Notes

- Once the battery pack is disconnected, the loads are not protected from power outages.
- Be careful removing the batteries - they are heavy.
- Small sparks at the battery connectors are normal during connection.

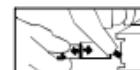


1. Reach into the finger pull and remove the front cover.

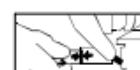
2. Use a flat-blade screwdriver to turn the two battery door screws  $\frac{1}{4}$  turn counterclockwise; open the door.

3. Grasp the clear plastic tab and gently pull the battery pack out of the UPS until the battery connector is visible.

**Warning!** Do not force the battery pack out. This may damage internal wiring!



4. Disconnect the battery connector by gripping both sides of the connector and firmly pulling them apart.



5. Slide the battery pack out of the UPS.

6. Slide the new battery pack three-fourths of the way into the UPS.

7. Connect the battery connector attached to the unit to the connector attached to the new battery pack.

## Specifications

	250 VA	450 VA
Acceptable input voltage	0 - 160 VAC	
Input voltage (on-line operation)	81-143 VAC	
Output voltage	106-127 VAC	
Input Over Current Protection	Resettable circuit breaker	
Frequency limits (on-line operation)	47 - 63 Hz	
Transfer time	4 ms typical, blackout response time	
Maximum load	250 VA 165 W	450 VA 280 W
On-battery output voltage	115 VAC	
On-battery frequency	60 Hz, ±0.1 Hz; unless synchronized to utility during brownout	
On-battery waveshape	Stepped sine-wave	
Output Over Current Protection	Overcurrent and short-circuit protected, latching shutdown on overload	
Battery type	Spill proof, maintenance free, sealed lead-acid	
Typical battery life	3 to 6 years, depending on number of discharge cycles and ambient temperature	
Typical recharge time	4 to 8 hours from total discharge	
Operating temperature	0 to +40 °C (+32 to +104 °F)	
Storage temperature	-15 to +45 °C (+5 to +113 °F)	
Operating and storage relative humidity	5 to 95%, non-condensing	
Operating elevation	0 to +3,000 m (0 to +10,000 ft)	
Storage elevation	0 to +15,000 m (0 to +50,000 ft)	
Audible noise at 1 m (3 ft)	<38 dBA	
Size (H x W x D)	1.75 x 17.5 x 13.0 in.	
Weight - net (shipping)	18.5 (23) lbs	21.5 (26) lbs
Safety and approvals	UL1778, CSA 107.1	
EMC Emissions	FCC Part 15 Class A, VCCI Class A	
EMC Immunity	EN 50082-1	
RFI	IEC 1000-4-3	
EFT	EN 61000-4-4	
ESD	EN 61000-4-2	



- 8.Push the battery pack in as far as it will go. There are stops in the back to prevent it from going too far.
- 9.Close the battery door, turn the battery compartment screws ¼ turn clockwise, and replace the front cover.
- 10.Dispose of the old battery pack properly at an appropriate recycling facility or return it to the supplier in the packing material for the new battery pack. See the new battery pack instructions for more information.

## Service

If the UPS requires service do not return it to the dealer! Follow these steps:

- 1.Use the **Troubleshooting** section of the **Quick Reference Guide** to eliminate common problems.
- 2.Verify that no circuit breakers are tripped. A tripped circuit breaker is the most common UPS problem!
- 3.If the problem persists, call customer service or visit the APC Internet Website ([www.apcc.com](http://www.apcc.com)).
- 4.Note the model number of the UPS, the serial number, and the date purchased. A technician will ask you to describe the problem and try to solve it over the phone, if possible. If this is not possible the technician will issue a Return Merchandise Authorization Number (RMA#).
- 5.If the UPS is under warranty, repairs are free. If not, there is a repair charge.
- 6.Disconnect the batteries before packing the UPS.
- 7.Pack the UPS in its original packaging. If the original packing is not available, ask customer service about obtaining a new set.
- 8.Pack the UPS properly to avoid damage in transit. Never use Styrofoam beads for packaging. Damage sustained in transit is not covered under warranty.
- 9.Include a letter with your name, RMA#, address, copy of the sales receipt, description of the trouble, your daytime phone number, and a check (if necessary).
- 10.Mark the RMA# on the outside of the package.
- 11.Return the UPS by insured, prepaid carrier to the address given to you by Customer Service.

## LEDs and Audible Alarms

Function	LED				Tone*
UPS is on	●	○	●	●	—
UPS is running on battery	○	●	—	—	4
UPS is performing self-test	○	*	●	●	—
Overload	—	—	○	—	1
Overload shutdown	—	—	○	—	1
Output short circuit	—	—	○	—	1
Transformer failure	—	—	○	—	1
Low Battery (while on battery)	○	—	—	—	1
Replace battery condition	—	—	—	○	2
Battery disconnected in self test	●	●	●	●	3
<b>UPS internal alarms:</b>					
boost/trim failure	*	*	●	●	1
transfer relay weld	*	*	*	*	1
Sleep Mode	—	*	*	—	—

### Key:

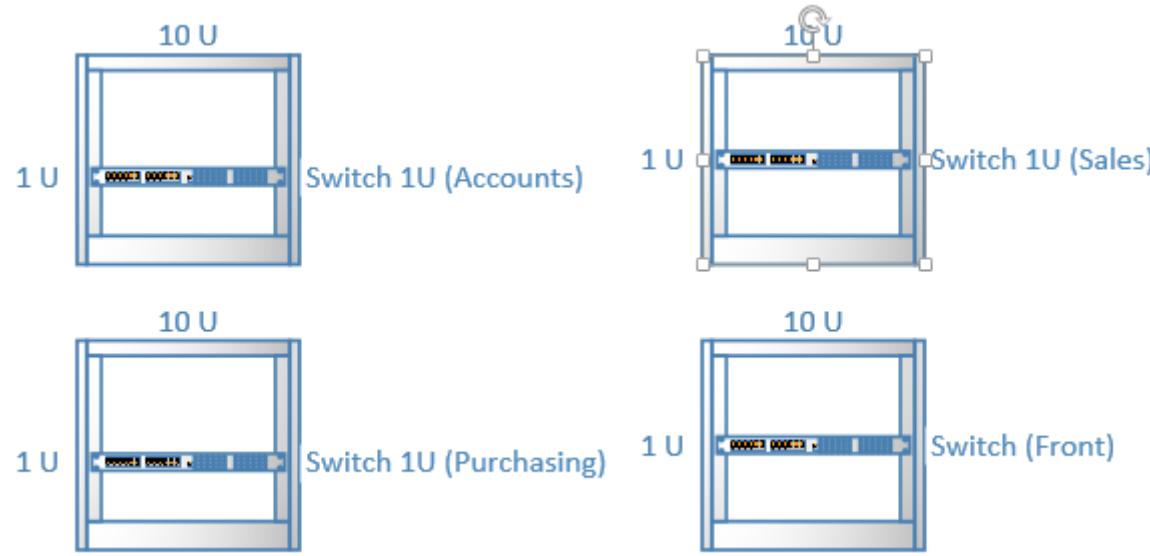
— = irrelevant to condition	* 1 = sustained tone
○ = on steady	2 = 1 minute of beeping every 5 hours
*	3 = fading tone
● = Off	4 = 4 beeps every 30 seconds

North & Latin America	Europe
<b>APC</b> 132 Fairgrounds Road West Kingston, Rhode Island 02892 USA	<b>APC</b> Ballybritt Business Park Galway, Ireland 1800-702000 Toll-free within the Republic of Ireland only
1-800-800-4APC/1-401-789-5735	Internet: <a href="http://www.apcc.com">http://www.apcc.com</a>
E-Mail: North America: <a href="mailto:apctech@apcc.com">apctech@apcc.com</a> Latin America: <a href="mailto:apctchla@apcc.com">apctchla@apcc.com</a>	E-Mail: Europe: <a href="mailto:apceurtech@apcc.com">apceurtech@apcc.com</a>

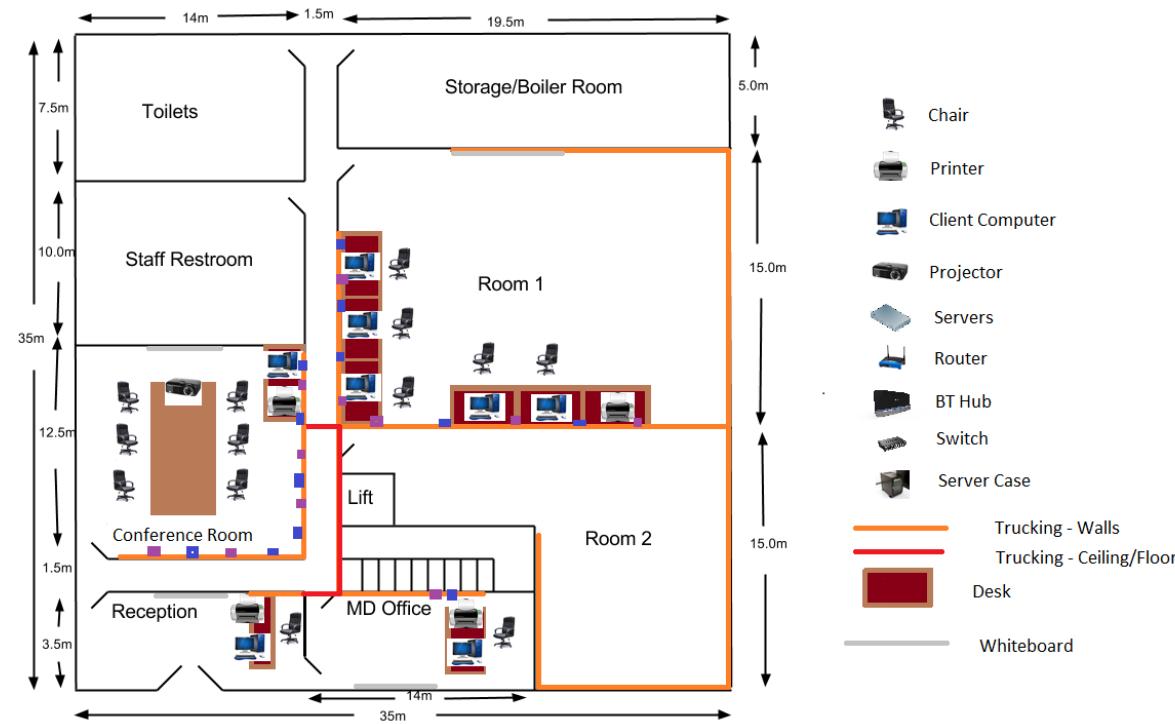
Appendix 119: Switch: TP Link 48 Port 10/100 Rackmount Switch

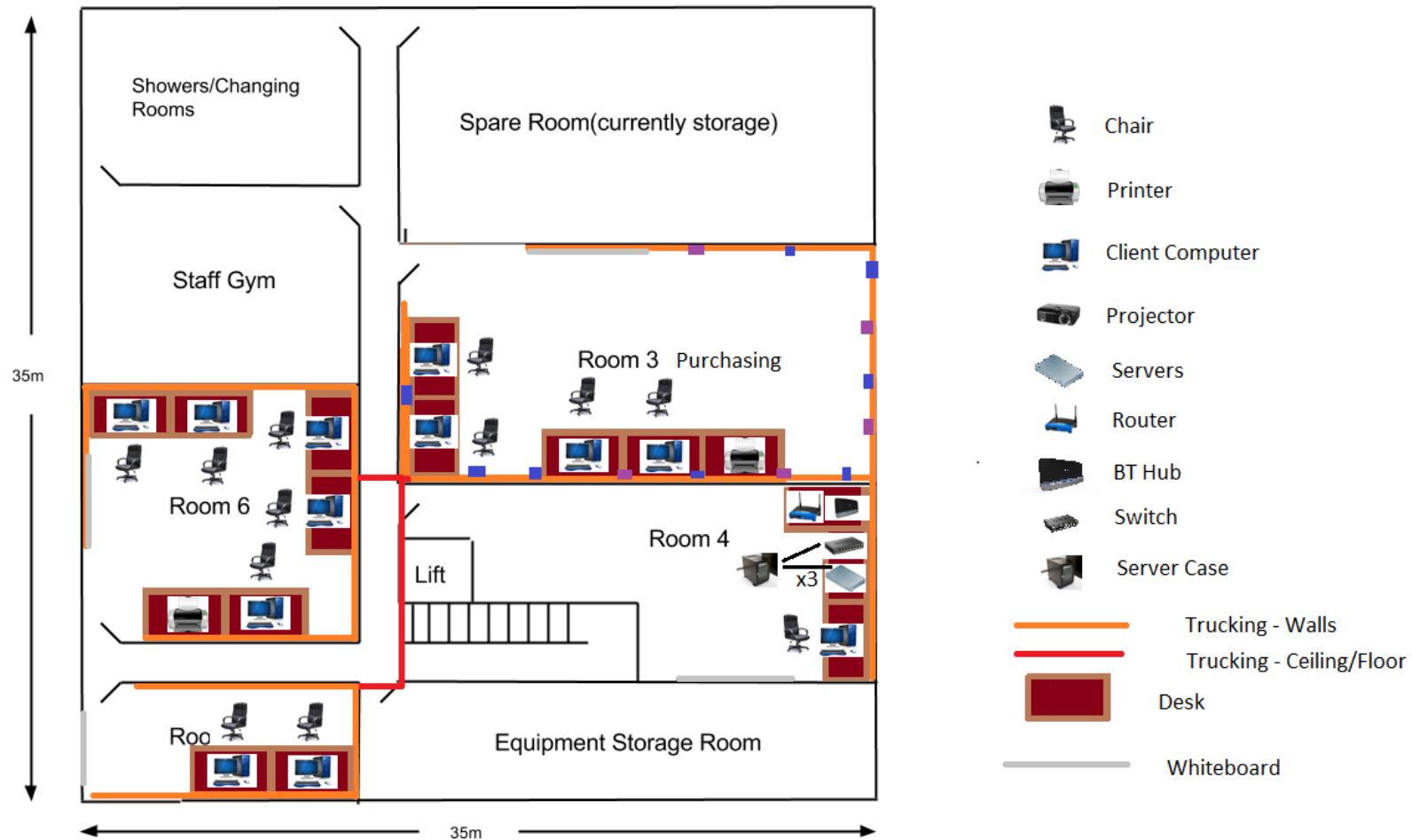


## Appendix 120: Switch MDF

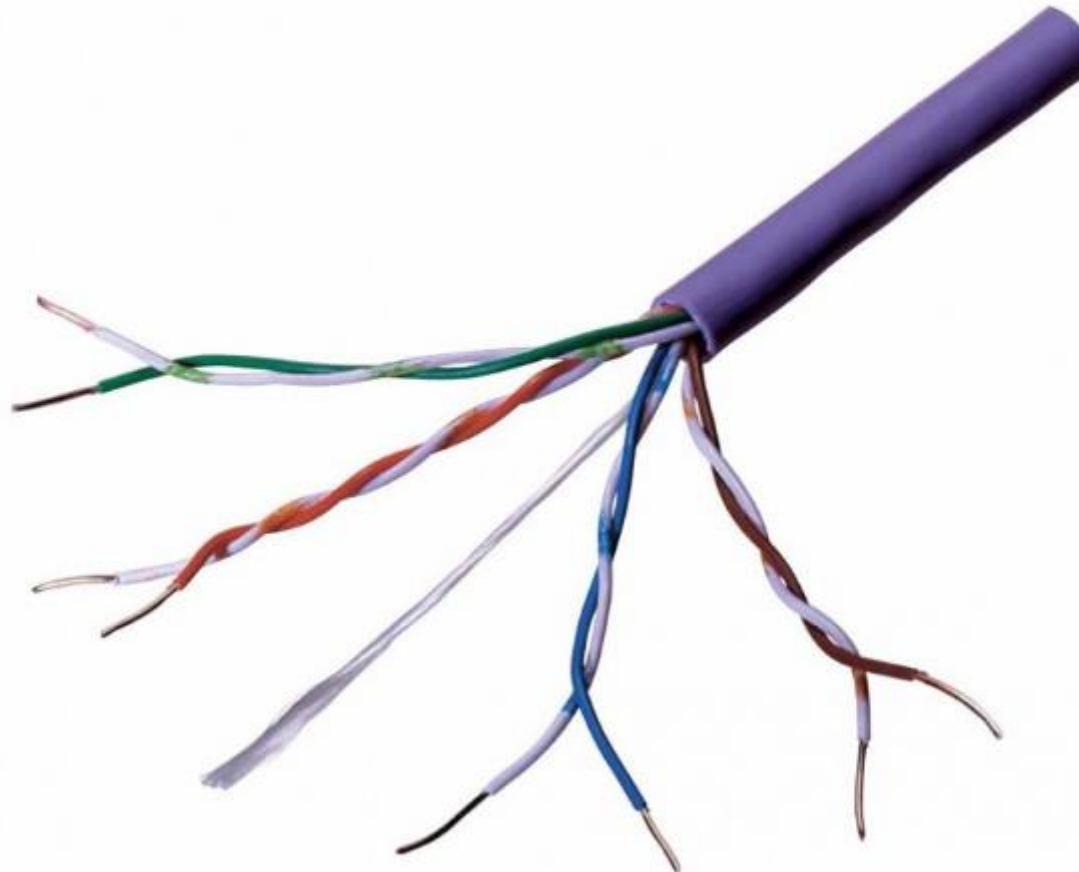


## Appendix 121: Cabling Diagram





Appendix 122: Cabling: Cat5e



## [Appendix 123: Cabling: Cat5e wiring methodology](#)

How to wire your own ethernet cables and connectors.

### **What You Need:**

#### **Required:**

Ethernet Cable - bulk Category (Cat) 5, 5e, 6, 6a or higher ethernet cable

Wire Cutters - to cut and strip the ethernet cable if necessary

#### **For Patch Cables:**

8P8C Modular Connector Plugs ("RJ45")

Modular Connector Crimper ("RJ45")

#### **For Fixed Wiring:**

8P8C Modular Connector Jacks ("RJ45")

110 Punch Down Tool

#### **Recommended:**

Wire Stripper

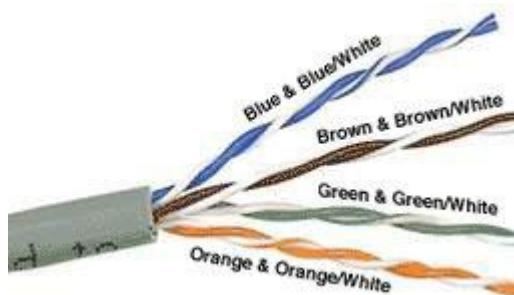
Cable Tester

### **About the Cable:**

You can find bulk supplies of ethernet cable at many computer stores or most electrical or home centers. You want UTP (Unshielded Twisted Pair) ethernet cable of at least Category 5 (Cat 5). Cat 5 is required for basic 10/100 functionality, you will want Cat 5e for gigabit (1000BaseT) operation and Cat 6 or higher gives you a measure of future proofing. You can also use STP (Shielded Twisted Pair) for extra resistance to external interference but I won't cover

shielded connectors. Bulk ethernet cable comes in many types, there are 2 basic categories, solid and braided stranded cable. Stranded ethernet cable tends to work better in patch applications for desktop use. It is more flexible and resilient than solid ethernet cable and easier to work with, but really meant for shorter lengths. Solid ethernet cable is meant for longer runs in a fixed position. Plenum rated ethernet cable must be used whenever the cable travels through an air circulation space. For example, above a false ceiling or below a raised floor. It may be difficult or impossible to tell from the package or labelling what type of ethernet cable it is, so peal out an end and investigate.

Here is what the internals of the ethernet cable look like:



Internal Cable Structure and Color Coding

Inside the ethernet cable, there are 8 color coded wires. These wires are twisted into 4 pairs of wires, each pair has a common color theme. One wire in the pair being a solid or primarily solid colored wire and the other being a primarily white wire with a colored stripe (Sometimes ethernet cables won't have any color on the striped wire, the only way to tell which is which is to check which wire it is twisted around). Examples of the naming schemes used are: Orange (alternatively Orange/White) for the solid colored wire and White/Orange for the striped cable. The twists are extremely important. They are there to counteract noise and interference. It is important to wire according to a standard to get proper performance from the ethernet cable. The TIA/EIA-568-A specifies two wiring standards for an 8-position modular connector such as RJ45. The two wiring standards, T568A and T568B vary only in the arrangement of the colored pairs. Tom writes to say "...sources suggest using T568A cabling since T568B is the AT&T standard, but the US Government specifies T568A since it matches USOC cabling for pairs 1 & 2, which allows it to work for 1/2 line phones...". Your choice might be determined by the need to match existing wiring, jacks or personal preference, but you should maintain consistency. I've shown both below for straight through cabling and just T568B for crossover cabling.

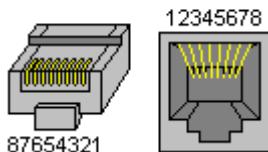
#### About Modular Connector Plugs and Jacks:

The 8P8C modular connectors for Ethernet are often called RJ45 due to their physical resemblance. The plug is an 8-position modular connector that looks like a large phone plug. There are a couple variations available. The primary variation you need to pay attention to is whether the connector is intended for braided or solid wire. For braided/stranded wires, the connector has sharp pointed contacts that actually pierce the wire. For solid wires, the connector has fingers which cut through the insulation and make contact with the wire by grasping it from both sides. The connector is the weak point in an ethernet cable, choosing the wrong one will often cause grief later. If you just walk into a computer store, it's nearly impossible to tell what type of plug it is. You may be able to determine what type it is by crimping one without a cable.

Modular connector jacks come in a variety styles intended for several different mounting options. The choice is one of requirements and preference. Jacks are designed to work only with solid ethernet cable. Most jacks come labeled with color coded wiring diagrams for either T568A, T568B or both. Make sure you end up with the correct one.

Here is a wiring diagram and pin out:

Where is pin #1?

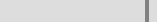


Modular Connector Plug and Jack Pin Out

#### Ethernet Cable Pin Outs:

There are two basic ethernet cable pin outs. A straight through ethernet cable, which is used to connect to a hub or switch, and a crossover ethernet cable used to operate in a peer-to-peer fashion without a hub/switch. Generally all fixed wiring should be run as straight through. Some ethernet interfaces can cross and un-cross a cable automatically as needed, a handy feature.

#### Standard, Straight-Through Wiring Diagram(both ends are the same):

RJ45 Pin #	Wire Color (T568A)	Wire Diagram (T568A)	10Base-T Signal 100Base-TX Signal	1000Base-T Signal
1	White/Green		Transmit+	BI_DA+
2	Green		Transmit-	BI_DA-
3	White/Orange		Receive+	BI_DB+
4	Blue		Unused	BI_DC+
5	White/Blue		Unused	BI_DC-
6	Orange		Receive-	BI_DB-
7	White/Brown		Unused	BI_DD+
8	Brown		Unused	BI_DD-

Straight-Through Ethernet Cable Pin Out for T568A

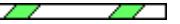
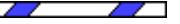
RJ45 Pin #	Wire Color (T568B)	Wire Diagram (T568B)	10Base-T Signal 100Base-TX Signal	1000Base-T Signal
1	White/Orange		Transmit+	BI_DA+

RJ45 Pin #	Wire Color (T568B)	Wire Diagram (T568B)	10Base-T Signal 100Base-TX Signal	1000Base-T Signal
2	Orange		Transmit-	BI_DA-
3	White/Green		Receive+	BI_DB+
4	Blue		Unused	BI_DC+
5	White/Blue		Unused	BI_DC-
6	Green		Receive-	BI_DB-
7	White/Brown		Unused	BI_DD+
8	Brown		Unused	BI_DD-

Straight-Through Ethernet Cable Pin Out for T568B

#### Crossover Cable Wiring Diagram(T568B):

RJ45 Pin # (END 1)	Wire Color	Diagram End #1	RJ45 Pin # (END 2)	Wire Color	Diagram End #2
1	White/Orange		1	White/Green	
2	Orange		2	Green	

RJ45 Pin # (END 1)	Wire Color	Diagram End #1	RJ45 Pin # (END 2)	Wire Color	Diagram End #2
3	White/Green		3	White/Orange	
4	Blue		4	White/Brown	
5	White/Blue		5	Brown	
6	Green		6	Orange	
7	White/Brown		7	Blue	
8	Brown		8	White/Blue	

#### Crossover Ethernet Cable Pin Outs

+Note: The crossover ethernet cable layout is suitable for 1000Base-T operation, all 4 pairs are crossed.

#### How to wire Ethernet Patch Cables:

Strip off about 2 inches of the ethernet cable sheath.

Untwist the pairs - don't untwist them beyond what you have exposed, the more untwisted cable you have the worse the problems you can run into.

Align the colored wires according to the wiring diagrams above.

Trim all the wires to the same length, about 1/2" to 3/4" left exposed from the sheath.

Insert the wires into the RJ45 plug - make sure each wire is fully inserted to the front of the RJ45 plug and in the correct order. The sheath of the ethernet cable should extend into the plug by about 1/2" and will be held in place by the crimp.

Crimp the RJ45 plug with the crimper tool.

Verify the wires ended up the right order and that the wires extend to the front of the RJ45 plug and make good contact with the metal contacts in the RJ45 plug

Cut the ethernet cable to length - make sure it is more than long enough for your needs.

Repeat the above steps for the second RJ45 plug.

#### **How to wire fixed Ethernet Cables:**

Run the full length of ethernet cable in place, from endpoint to endpoint, making sure to leave excess.

At one end, cut the wire to length leaving enough length to work, but not too much excess.

Strip off about 2 inches of the ethernet cable sheath.

Align each of the colored wires according to the layout of the jack.

Use the punch down tool to insert each wire into the jack.

Repeat the above steps for the second RJ45 jack.

If an ethernet cable tester is available, use it to verify the proper connectivity of the cable. That should be it, if your ethernet cable doesn't turn out, look closely at each end and see if you can find the problem. Often a wire ended up in the wrong place or one of the wires is making no contact or poor contact. Also double check the color coding to verify it is correct. If you see a mistake or problem, cut the end off and start again. A ethernet cable tester is invaluable at identifying and highlighting these issues.

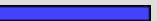
When sizing ethernet cables remember that an end to end connection should not extend more than 100m (~328ft). Try to minimize the ethernet cable length, the longer the cable becomes, the more it may affect performance. This is usually noticeable as a gradual decrease in speed and increase in latency.

---

#### **Notes:**

### **Power over Ethernet (PoE):**

Power over Ethernet has been implemented in many variations before IEEE standardized 802.3af. IEEE 802.3af specifies the ability to supply an endpoint device with 48V DC at up to 350mA or approximately 16.8W. IEEE 802.3at updates the PoE standard to supply up to 600mA or approximately 28.8W, it is often known as PoE+. The device must be capable of receiving power on either the data pairs [Mode A] (often called phantom power) or the unused pairs in 100Base-TX [Mode B]. PoE can be used with any ethernet configuration, including 10Base-T, 100Base-TX or 1000Base-T. Power is only supplied when a valid PoE endpoint is detected by using a low voltage probe to look for the PoE signature on the endpoint. PoE power is typically supplied in one of two ways, either the host ethernet switch provides the power, or a "midspan" device is plugged in between the switch and endpoints and supplies the power. No special cabling is required.

RJ45 Pin #	Wire Color (T568A)	Wire Diagram (T568A)	10Base-T Signal 100Base-TX Signal	PoE
1	White/Green		Transmit+	Mode A +
2	Green		Transmit-	Mode A +
3	White/Orange		Receive+	Mode A -
4	Blue		Unused	Mode B +
5	White/Blue		Unused	Mode B +
6	Orange		Receive-	Mode A -
7	White/Brown		Unused	Mode B -

RJ45 Pin #	Wire Color (T568A)	Wire Diagram (T568A)	10Base-T Signal 100Base-TX Signal	PoE
8	Brown		Unused	Mode B -

Power over Ethernet Power Delivery

#### Protocol Details:

Protocol	Standard	Symbol Encoding	Symbol Rate (Mbaud)	Data Encoding	Data Bits per Symbol	Pairs per Channel	Pairs Used	Nyquist Frequency Bandwidth (MHz)	Minimum Cable Category
10Base-T	IEEE 802.3i	Manchester	10	None	1	1	2	10	3
100Base-TX	IEEE 802.3u	MLT-3	125	4B5B	4/5	1	2	62.5	5
1000Base-T	IEEE 802.3ab	4D-PAM5	125	None	2	4	4	62.5	5e (5) <sup>1</sup>
10GBase-T	IEEE 802.3an	DSQ128 (2D-PAM16)	800	LDPC(1723,2048), 64B/65B, CRC8	3.125	4	4	400	6a (6) <sup>2</sup>

**Data Rate = Symbol Rate x Data Bits per Symbol x Pairs per Channel**

The combination of the Symbol Encoding and Data Encoding determines how many Data Bits per Symbol there are.

1. Designed to work on most Cat 5 ethernet cable, Cat 5e specifications ensure 1000Base-T operation.

2. Reduced range when used with Cat 6 (55m), Cat 6a supports the full 100m range. Some Cat 5e may support operation at reduced distance.

**Cable Category Details:**

Cable Category	Rated Nyquist Frequency Bandwidth (MHz)	Common Uses
1	None	Telephone Wiring
2	1	Telephone Wiring
3	16	Telephone Wiring, 10Base-T
4	20	Token-Ring, 10Base-T
5	100	100Base-TX, 10Base-T
5e	100	1000Base-T, 100Base-TX
6	250	1000Base-T, 100Base-TX
6a	500	10GBase-T
7 <sup>1</sup>	600	>10GBase-T
7a <sup>1</sup>	1000	>10GBase-T

Increasing category levels are backward compatible.

Manufacturers will often test and certify their ethernet cable well beyond the standards.

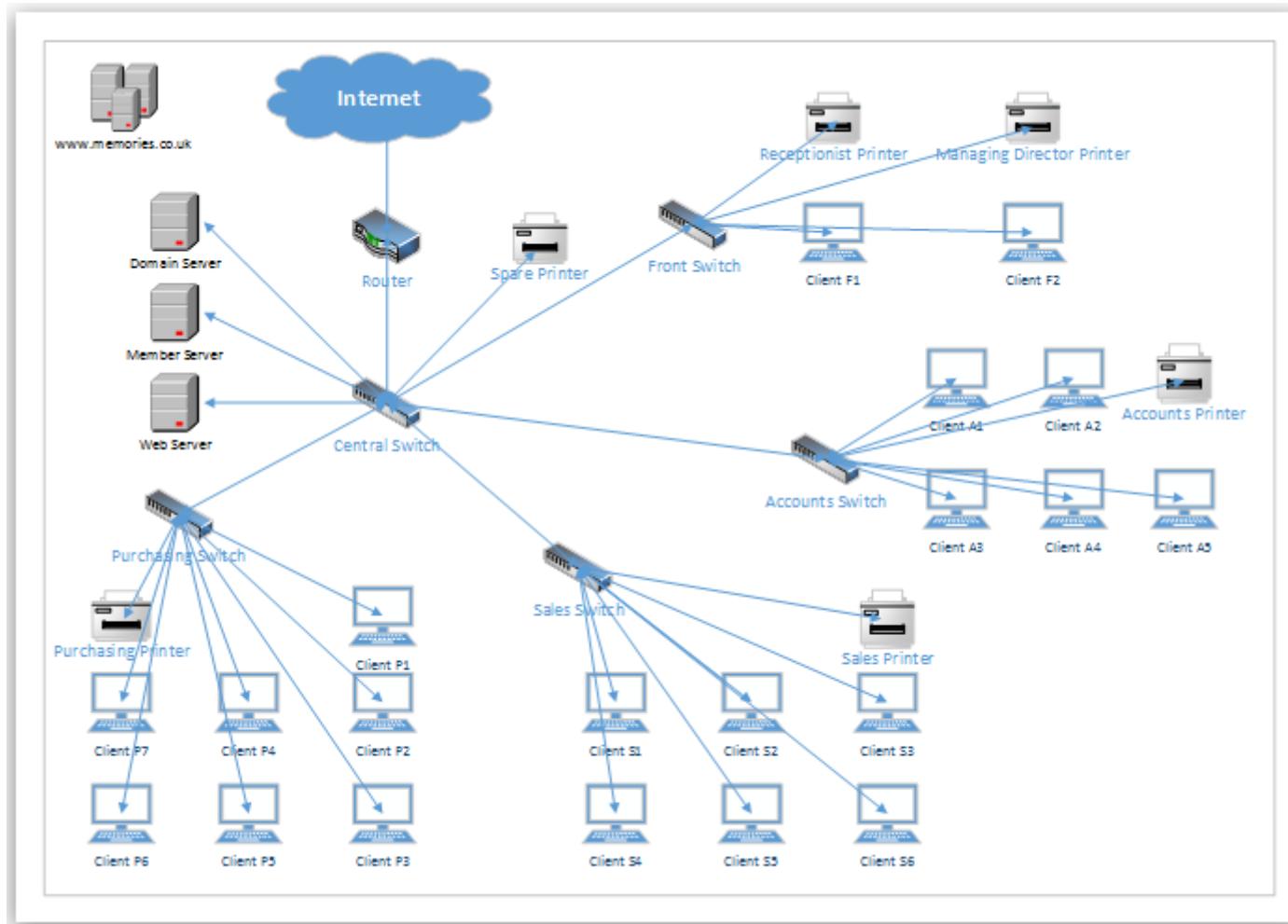
1. Category 7/7A cabling does not use RJ45 connectors.



## Topology Appendices

Topology Information:

Appendix 124: Crichton Memories Topology Diagram



## Appendix 125: Extended Star Topology Description

### **Extended star**

A type of network topology in which a network that is based upon the physical star topology has one or more repeaters between the central node (the 'hub' of the star) and the peripheral or 'spoke' nodes, the repeaters being used to extend the maximum transmission distance of the point-to-point links between the central node and the peripheral nodes beyond that which is supported by the transmitter power of the central node or beyond that which is supported by the standard upon which the physical layer of the physical star network is based.

If the repeaters in a network that is based upon the physical extended star topology are replaced with hubs or switches, then a hybrid network topology is created that is referred to as a physical hierarchical star topology, although some texts make no distinction between the two topologies.

## Installation and configuration of shared printing devices - Appendices

Printing information:

# Start Here

Read these instructions before using your product.  
**Note for Spanish speakers/Nota para hispanohablantes:** Para obtener instrucciones de configuración en español, consulte la Guía de instalación en [epson.com/support/wf2650sp](http://epson.com/support/wf2650sp) o [epson.com/support/wf2660sp](http://epson.com/support/wf2660sp) (requiere una conexión a Internet).

## 1 Unpack



**Note:** Do not open ink cartridge packages until you are ready to install the ink. Cartridges are vacuum packed to maintain reliability.

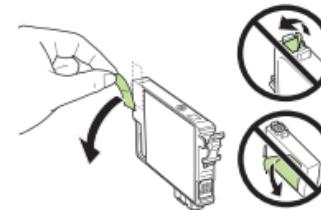
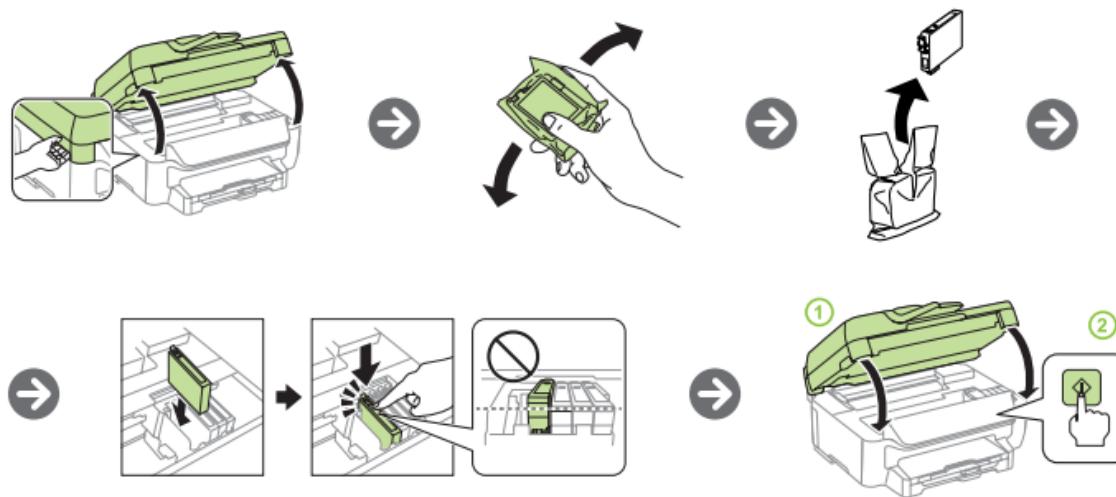
## 2 Turn on and configure



Select your language, country, date, and time.  
**Note:** You can change these settings later using the product's control panel. For more information, see the online User's Guide.

**Caution:** Do not connect to your computer yet.

### 3 Install ink cartridges



Remove only the yellow tape from each cartridge.

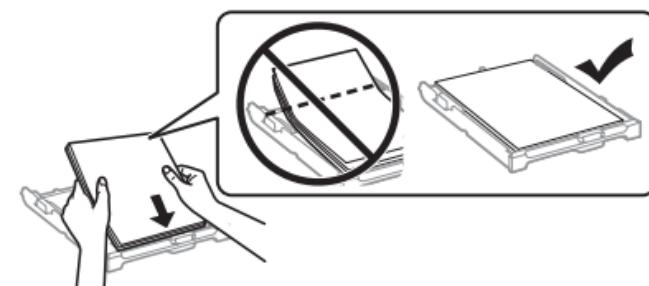
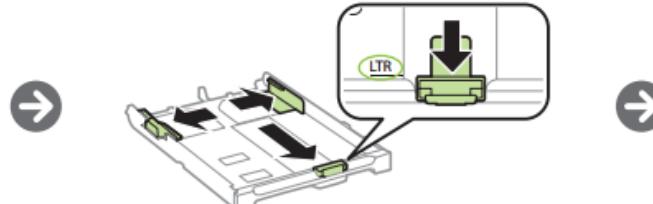
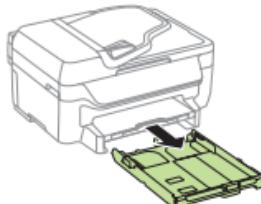
**Caution:** Don't remove any other seals or the cartridges may leak.

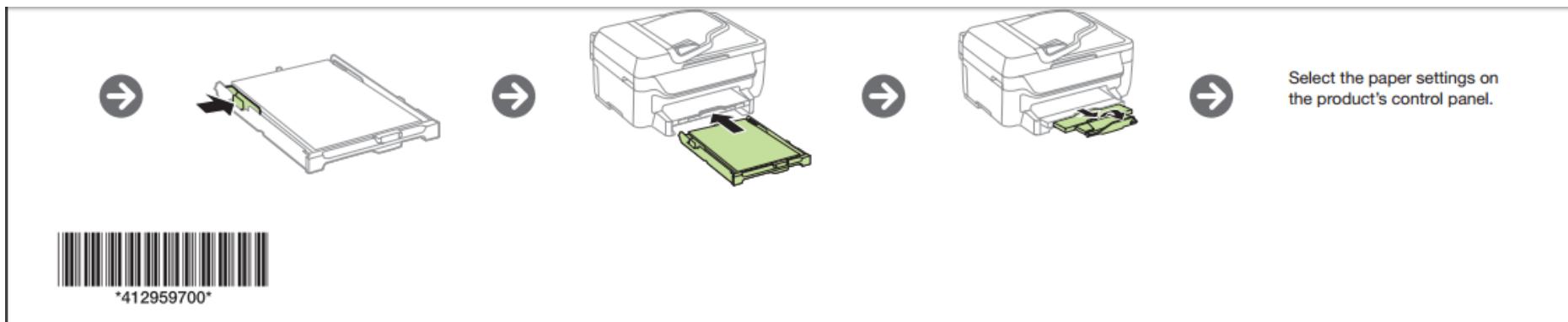
**Note:**

- The printer is designed for use with Epson® cartridges only, not third-party cartridges or ink.
- The cartridges included with the printer are designed for printer setup and not for resale. After some ink is used for priming, the rest is available for printing.

**Caution:** Don't turn off the printer while it is priming or you'll waste ink.

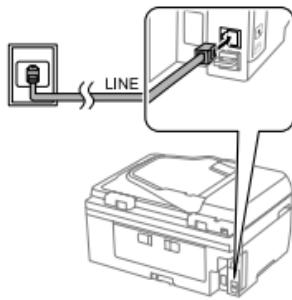
### 4 Load paper





## 5 Connect the fax line

- 1 Connect a phone cord to a telephone wall jack and to the **LINE** port on your product. See the online *User's Guide* for more information.
- 2 Press **▲** (WF-2650) or **Start** (WF-2660) if you want to set up the fax, or press **▼** (WF-2650) or **Close** (WF-2660) to set it up later.

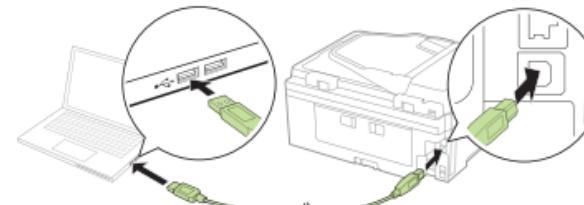


### The printer's screen is dark.

Make sure your product is turned on and press any button to wake it from sleep mode.

### Setup is unable to find my printer after connecting it with a USB cable.

Make sure it is securely connected as shown:



# 6

## Install software

**Note:** If your computer does not have a CD/DVD drive or you are using a Mac, an Internet connection is required to obtain the printer software.

- 1 Make sure the printer is **NOT CONNECTED** to your computer.

**Windows®:** If you see a Found New Hardware screen, click **Cancel** and disconnect the USB cable.



- 2 Insert the product CD or download and run your product's software package:

WF-2650: [epson.com/support/wf2650](http://epson.com/support/wf2650) (U.S.)  
[epson.ca/support/wf2650](http://epson.ca/support/wf2650) (Canada)

WF-2660: [epson.com/support/wf2660](http://epson.com/support/wf2660) (U.S.)  
[epson.ca/support/wf2660](http://epson.ca/support/wf2660) (Canada)

- 3 Follow the instructions on the screen to run the setup program.

**OS X:** Make sure you install Software Updater to receive firmware and software updates for your product.

- 4 When you see the Select Your Connection screen, select one of the following:

- **Wireless connection**

Make sure you know your network name (SSID) and network password.

- **Direct USB connection**

Make sure you have a USB cable (not included).

- **Wired network connection (WF-2660)**

Make sure you have an Ethernet cable (not included).

- 5 When software installation is complete, restart your computer.

## Any questions?

### Quick Guide

Basic information and troubleshooting.

### User's Guide

**Windows:** Click the icon on your desktop or Apps screen to access the online **User's Guide**.

**OS X:** Click the icon in **Applications/Epson Software/Guide** to access the online **User's Guide**.

If you don't have a User's Guide icon, go to the Epson website, as described below.

### Technical support

[epson.com/support](http://epson.com/support) (U.S.) or [epson.ca/support](http://epson.ca/support) (Canada)

Call (562) 276-4382 (U.S.) or (905) 709-3839 (Canada), 6 AM to 8 PM, Pacific Time, Monday through Friday, and 7 AM to 4 PM, Pacific Time, Saturday. Days and hours of support are subject to change without notice. Toll or long distance charges may apply.

### Recycling

Epson offers a recycling program for end of life hardware and ink cartridges. Please go to [epson.com/recycle](http://epson.com/recycle) for information on how to return your products for proper disposal.

## Need paper and ink?



Try Epson specialty papers with DURABrite® Ultra Ink for professional results. You can purchase them at [epson.com/ink3](http://epson.com/ink3) (U.S. sales) or [epson.ca](http://epson.ca) (Canadian sales). You can also purchase supplies from an Epson authorized reseller. Call 800-GO-EPSON (800-463-7766).

## Mobile printing

Your product must be set up for wireless printing or Wi-Fi Direct®. See the online User's Guide for instructions.

### iOS/Android™



[epson.com/iPrint](http://epson.com/iPrint)

### Epson Connect™

Connect wirelessly from your tablet, smartphone, or computer. Print documents and photos from across the room or around the world.

[epson.com/connect](http://epson.com/connect)

## Any problems?

### Network setup was unsuccessful.

- Make sure you select the right network name (SSID). The printer can only connect to a network that supports 2.4 GHz.
- If you see a firewall alert message, click **Unblock** or **Allow** to let setup continue.
- If your network has security enabled, make sure you enter your network password (WEP key or WPA passphrase) correctly. Password must be entered in the correct case.

### There are lines or incorrect colors in my printouts.

Run a nozzle check to see if any of the print head nozzles are clogged. Then clean the print head, if necessary. See the online User's Guide for more information.

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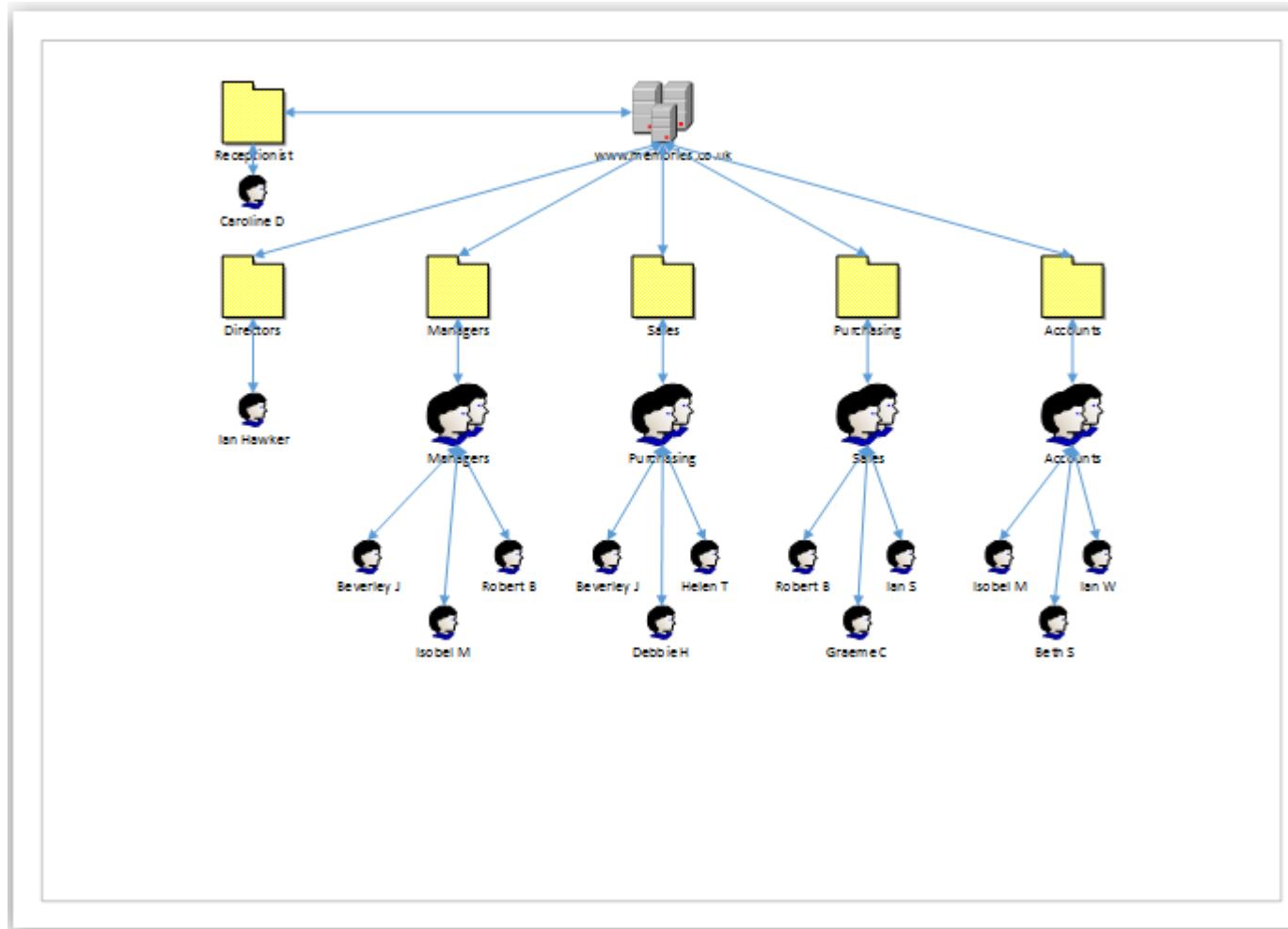
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## Implementation of users, groups and security - Appendices

All information regarding the configurations of users, groups and security features:

### Appendix 127: Organisational Unit



## Appendix 128: File Access

Employee	Occupation	Network Privileges
Iain Hawker	Manager Director	Access to all files, read only access.
Robert Burns	Sales Manager	Access to Sales group files.
Beverley Jackson	Purchasing Manager	Access to Purchasing group files.
Isobel Macintosh	Accounts Manager	Access to Accounts group files.
Ian Shand (Off site)	Sales Staff	Access to only their own files.
Graeme Clark (Off site)	Sales Staff	Access to only their own files.
Debbie Hawkins	Purchasing Staff	Access to only their own files.
Helen Templeton	Purchasing Staff	Access to only their own files.
Ian White	Accounts Staff	Access to only their own files.
Beth Scrimaeour	Accounts Staff	Access to only their own files.
Caroline Donohue	Receptionist	Access to only their own files.

## Appendix 129: Roaming Profiles Configuration

### Creating a Roaming User Profile

Creating a roaming user profile is a two-step process. First you create a test user profile, and then you copy the test user profile to a network server.

#### Create a Test Profile

To create a test profile for the roaming user, follow these steps:

1. Log on as Administrator.
2. Click **Start**, point to **Administrative Tools**, and then click **Computer Management**.
3. In the console tree, expand **Local Users and Groups**, and then click **Users**.
4. Right-click **Users**, and then click **New User**.

5. Type a name and password for the user.
6. Click to clear **User must change password at next logon**.
7. Click **Create**, and then click **Close**.
8. Quit the Computer Management snap-in.
9. Log off the computer.
10. Log on as the test user account that you created in step 7.

A user profile is automatically created on the local computer in the drive:\Documents and Settings\username\folder (where drive is the drive on which Windows is installed).

11. Configure the desktop environment, including appearance, shortcuts, and **Start** menu options.
12. Log off, and then log on as Administrator.

#### Copy the Test Profile

To copy the test profile to a network server, follow these steps:

1. Create a folder on a network drive in which you can store network profiles. For example:  
**\server\_name\Profiles\user\_name**
2. Click **Start**, point to **Control Panel**, and then click **System**.
3. Click the **Advanced** tab, and then click **Settings** in the **User Profiles** section of the **System Properties** dialog box.
4. Under **Profiles Stored On This Computer**, click the profile for the user that you created in the "Create a Test Profile" section of this article, and then click **Copy To**.

5. In the **Copy Profile To** dialog box, type the network path to the folder.
6. Under **Permitted to Use**, click **Change**.
7. Type the name of the user account that you created in the "Create a Test Profile" section, and then click **OK**.
8. Click **OK** three times.
9. Click **Start**, point to **Administrative Tools**, and then click **Computer Management**.
10. In the console tree, expand **Local Users and Groups**, and then double-click **Users**.
11. Double-click the user account that you created in the "Create a Test Profile" section.
12. Click the **Profile** tab. In the **Profile path** box, type the path to the network profile folder. For example, type\\server\_name\Profiles\user\_name.
13. Click **OK**.
14. Quit the Computer Management snap-in.

**NOTE:** To make this profile mandatory, rename the Ntuser.dat file as Ntuser.man in the user's profile folder.

## Appendix 130: Quota Configuration

### Disc Quota Configuration

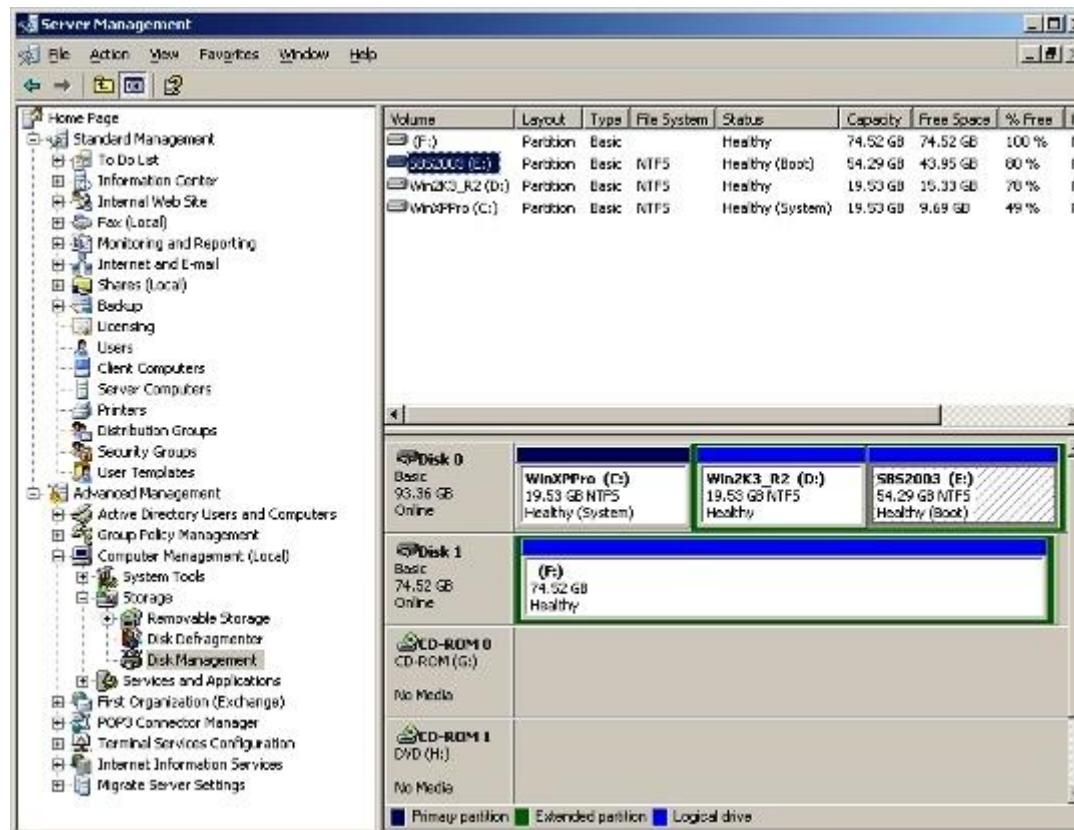
#### Windows Small Business Server 2003

To configure disk quota warnings and limitations for an individual user in Windows Small Business Server 2003 (**Figure A**):

1. Log on to the Windows Small Business Server 2003 box as a member of the Administrators or Domain Admins group.
2. Open the Server Management console from the Start menu or using a desktop icon.
3. Expand the Advanced Management entry in the left pane.

4. Expand Computer Management.
5. Expand Storage.
6. Select Disk Management.

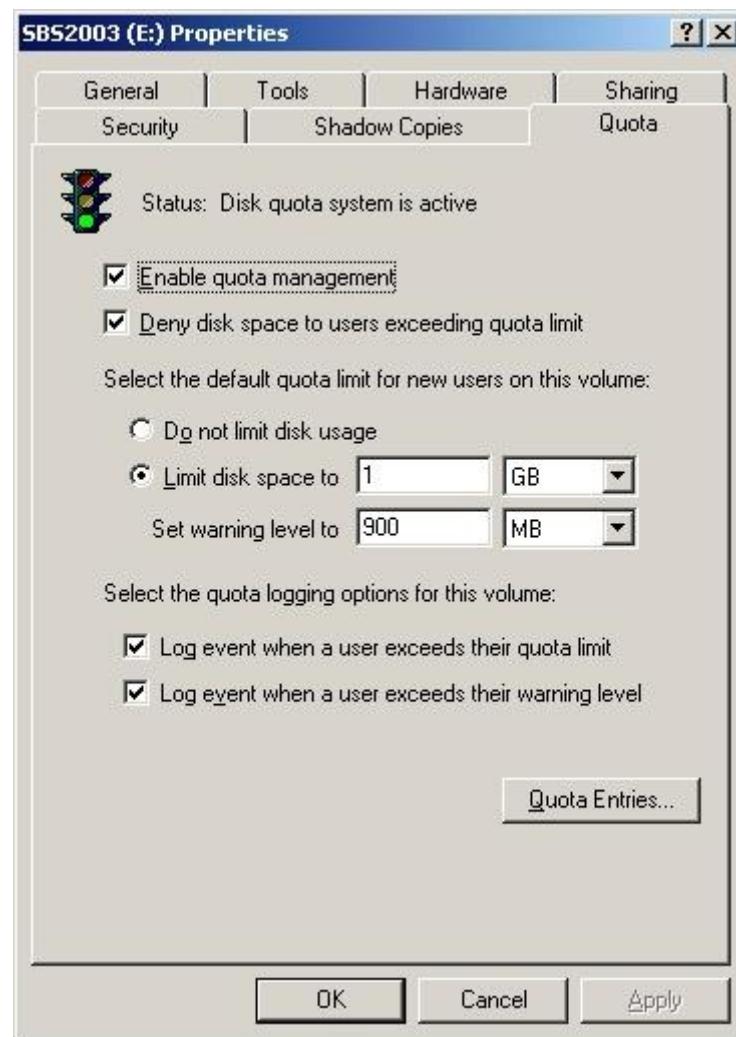
**Figure A**



Navigate to the Disk Management console within Server Manager to view available disks and partitions.

7. Right-click the disk volume for which you wish to set user quotas and click Properties.
8. Highlight the Quota tab (**Figure B**).

**Figure B**

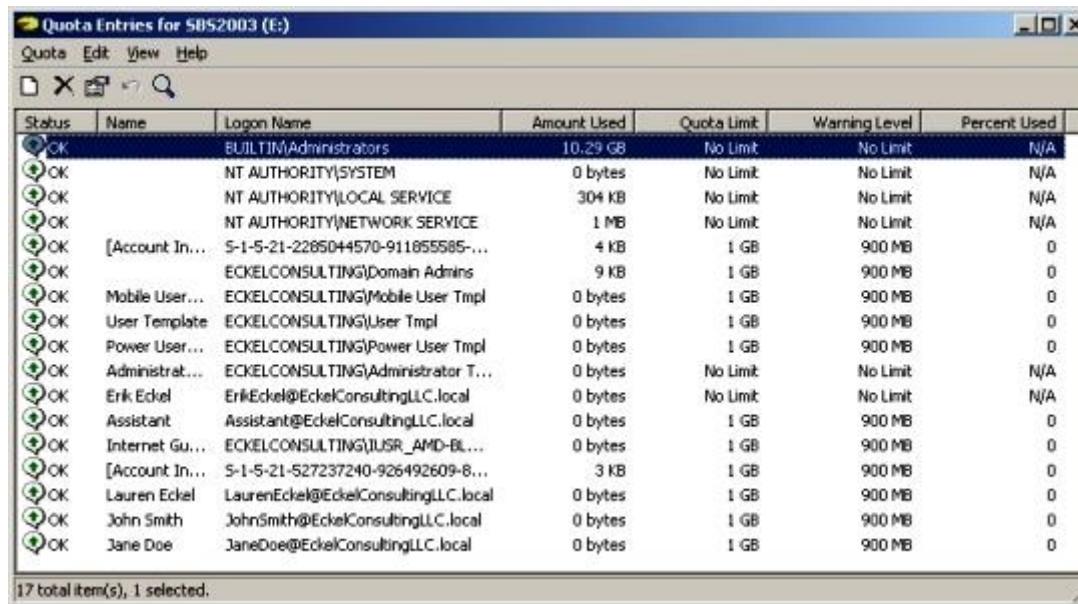


Use a volume's Properties dialog box to enable and configure disk quotas.

9. Confirm the Enable Quota Management checkbox is selected.

10. Confirm the Deny Disk Space To Users Exceeding Quota Limit is checked.
11. Click the Quota Entries button.
12. The Quota Entries For *VolumeName* (*DriveLetter*:) console will appear (**Figure C**).

**Figure C**



The screenshot shows a Windows application window titled "Quota Entries for SBS2003 (E:)". The window has a menu bar with "Quota", "Edit", "View", and "Help". Below the menu is a toolbar with icons for "New", "Edit", "Delete", "Search", and "Help". The main area is a table with the following columns: Status, Name, Logon Name, Amount Used, Quota Limit, Warning Level, and Percent Used. There are 17 items listed, all marked as "OK". The table data is as follows:

Status	Name	Logon Name	Amount Used	Quota Limit	Warning Level	Percent Used
OK	BUILTIN\Administrators		10.29 GB	No Limit	No Limit	N/A
OK	NT AUTHORITY\SYSTEM		0 bytes	No Limit	No Limit	N/A
OK	NT AUTHORITY\LOCAL SERVICE		304 KB	No Limit	No Limit	N/A
OK	NT AUTHORITY\NETWORK SERVICE		1 MB	No Limit	No Limit	N/A
OK	[Account In...	S-1-5-21-2285044570-911855585-...	4 KB	1 GB	900 MB	0
OK	ECKELCONSULTING\Domain Admins		9 KB	1 GB	900 MB	0
OK	Mobile User...	ECKELCONSULTING\Mobile User Tmpl	0 bytes	1 GB	900 MB	0
OK	User Template	ECKELCONSULTING\User Tmpl	0 bytes	1 GB	900 MB	0
OK	Power User...	ECKELCONSULTING\Power User Tmpl	0 bytes	1 GB	900 MB	0
OK	Administrat...	ECKELCONSULTING\Administrator T...	0 bytes	No Limit	No Limit	N/A
OK	Erik Ekel	ErikEkel@EckelConsultingLLC.local	0 bytes	No Limit	No Limit	N/A
OK	Assistant	Assistant@EckelConsultingLLC.local	0 bytes	1 GB	900 MB	0
OK	Internet Gu...	ECKELCONSULTING\IUSR_AMD-BL...	0 bytes	1 GB	900 MB	0
OK	[Account In...	S-1-5-21-527237240-926492609-8...	3 KB	1 GB	900 MB	0
OK	Lauren Eckel	LaurenEckel@EckelConsultingLLC.local	0 bytes	1 GB	900 MB	0
OK	John Smith	JohnSmith@EckelConsultingLLC.local	0 bytes	1 GB	900 MB	0
OK	Jane Doe	JaneDoe@EckelConsultingLLC.local	0 bytes	1 GB	900 MB	0

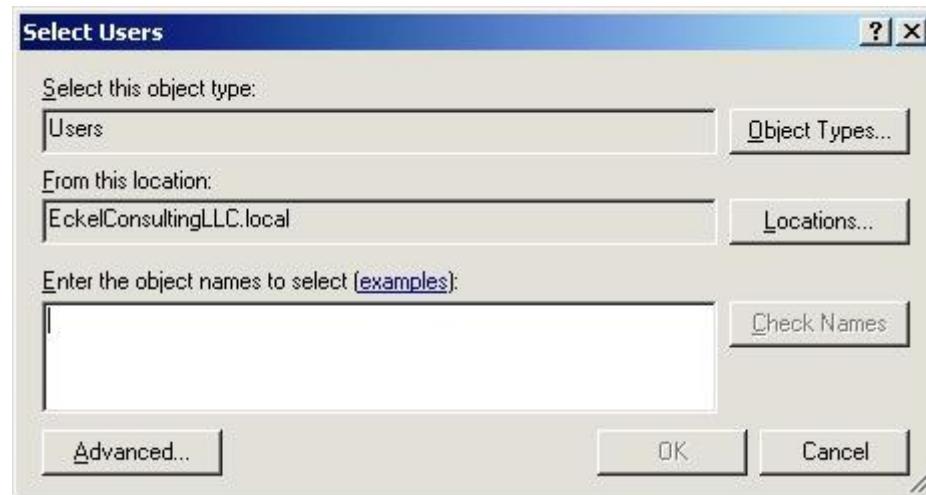
17 total item(s), 1 selected.

The Quota Entries for *VolumeName* console lists disk quotas that have been configured for that volume.

13. To adjust an existing user's entry, double-click that user's entry, ensure the Limit Disk Space To radio button is selected, and enter new values within the disk space limit and the warning level fields, select the appropriate label from the drop-down box (KB, MB, GB, TB, PB and EB are the available options) and click OK.

14. To create a new entry, click the New Quota Entry icon or click Quota | New Quota Entry, enter the user's name in the Enter The Object Names To Select (Examples): window and click OK. Specify disk space limits and warning levels and click OK. (**Figure D and E**)

**Figure D**



Use the Select Users dialog box to specify the user or users for whom you're creating disk quotas.

**Figure E**

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Use the Add New Quota Entry dialog box to configure warning levels and disk storage limits for specific users.

Windows Small Business Server 2003, by default, sets user disk quota limits on the volume where the User Shared Folders directory is located. The default limits set warning messages to be sent to users at 900MB, while disk storage is limited to 1GB. To change these default disk quota limits:

1. Log on to the Windows Small Business Server 2003 as a member of the Administrators or Domain Admins group.
2. Open the Server Management console and navigate to the volume Properties dialog box using the steps described above.
3. Ensure the checkboxes are checked for Enable Quota Management and Deny Disk Space To Users Exceeding Quota Limit.
4. Specify the new default disk space limits and warning levels.
5. Click OK.

Note that disk quotas only work on those disk volumes partitioned using the NTFS file system.

If you prefer working from the command line, you can use the *fsutil* command to change the default disk quota limits. To do so:

1. Click Start | Run.
2. Type *cmd* and press the Enter key to open a Command Prompt.
3. Type *fsutilquota modify [VolumePathname] [Threshold] [Limit] [Domain\Username]*.

Enter the threshold and limit values in bytes. For example, to change the disk quota warning level to 1.9 GB and set the storage limit to 2GB on a volume possessing the drive letter E for a user named Jane within the acme domain, from the command line you would enter:

```
fsutil quota modify e: 2040109465 2147483648 acme\jane
```

If the operation fails, be sure you entered the volume, domain and username correctly and that the user has disk quotas enabled.

## Appendix 131: Group Configuration

### Add a Group

To add a group, follow these steps:

1. Click **Start**, point to **All Programs**, point to **Administrative Tools**, and then click **Active Directory Users and Computers**.
2. In the console tree, expand **DomainName**, where *DomainName* is the name of your domain.
3. Right-click the folder where you want to add the group, point to **New**, and then click **Group**.
4. In the **Group name** box, type a name for the new group.

By default, the name that you type is also entered as the pre-Microsoft Windows 2000 name of the new group.

5. Under **Group scope**, click the option that you want, and then under **Group type**, click the option that you want.
6. Click **OK**.

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## Add a Member to a Group

To add a member to a group, follow these steps:

1. Click **Start**, point to **All Programs**, point to **Administrative Tools**, and then click **Active Directory Users and Computers**.
2. In the console tree, expand **DomainName**, where *DomainName* is the name of your domain.
3. Click the folder that contains the group where you want to add a member.
4. In the right pane, right-click the group where you want to add a member, and then click **Properties**.
5. Click the **Members** tab, and then click **Add**.
6. In the **Select User, Contacts, or Computers** dialog box, type the names of the users and computers that you want to add, and then click **OK**.
7. Click **OK**.

**Note** In addition to users and computers, membership in a particular group can include contacts and other groups.

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## Convert a Group to Another Group Type

To convert a group to another group type, follow these steps:

1. Click **Start**, point to **All Programs**, point to **Administrative Tools**, and then click **Active Directory Users and Computers**.
2. In the console tree, expand **DomainName**, where *DomainName* is the name of your domain.
3. Click the folder that contains the group.
4. In the right pane, right-click the group, and then click **Properties**.

5. Click the **General** tab, under **Group type**, click the group type that you want, and then click **OK**.

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## Change Group Scope

To change group scope, follow these steps:

1. Click **Start**, point to **All Programs**, point to **Administrative Tools**, and then click **Active Directory Users and Computers**.
2. In the console tree, expand **DomainName**, where *DomainName* is the name of your domain.
3. Click the folder that contains the group.
4. In the right pane, right-click the group, and then click **Properties**.
5. Click the **General** tab, under **Group scope**, click the group scope that you want, and then click **OK**.

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## Delete a Group

To delete a group, follow these steps:

1. Click **Start**, point to **All Programs**, point to **Administrative Tools**, and then click **Active Directory Users and Computers**.
2. In the console tree, expand **DomainName**, where *DomainName* is the name of your domain.
3. Click the folder that contains the group.
4. In the right pane, right-click the group that you want to delete, and then click **Delete**.
5. Click **Yes** when you are prompted to confirm the deletion.

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## Find a Group

To find a group, follow these steps:

1. Click **Start**, point to **All Programs**, point to **Administrative Tools**, and then click **Active Directory Users and Computers**.
2. In the console tree, right-click **DomainName**, where *DomainName* is the name of your domain, and then click **Find**.
3. Click the **Users, Contacts, and Groups** tab.
4. In the **Name** box, type the name of the group that you want to find, and then click **Find Now**.

**Note** For more powerful search options, click the **Advanced** tab, and then specify the search conditions that you want.

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## Find Groups where a User Is a Member

To find a group where a user is a member, follow these steps:

1. Click **Start**, point to **All Programs**, point to **Administrative Tools**, and then click **Active Directory Users and Computers**.
2. In the console tree, **DomainName**, where *DomainName* is the name of your domain, and then click **Users**.

Or, click the folder that contains the user account.

3. In the right pane, right-click the user account, and then click **Properties**.
4. Click the **Member Of** tab.

**Note** The **Member of** tab for a user displays a list of groups in the domain where the account of the user account is located. Active Directory does not display groups that are located in trusted domains where the user is a member.

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## Modify Group Properties

To modify the properties of a group, follow these steps:

1. Click **Start**, point to **All Programs**, point to **Administrative Tools**, and then click **Active Directory Users and Computers**.
2. In the console tree, expand **DomainName**, where *DomainName* is the name of your domain.
3. Click the folder that contains the group.
4. In the right pane, right-click the group, and then click **Properties**.
5. Make the changes that you want, and then click **OK**.

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## Remove a Member from a Group

To remove a member from a group, follow these steps:

1. Click **Start**, point to **All Programs**, point to **Administrative Tools**, and then click **Active Directory Users and Computers**.
2. In the console tree, expand **DomainName**, where *DomainName* is the name of your domain.
3. Click the folder that contains the group.
4. In the right pane, right-click the group, and then click **Properties**.
5. Click the **Members** tab.
6. Click the members who you want to remove from the group, and then click **Remove**.
7. Click **OK**.

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## Rename a Group

To rename a group, follow these steps:

1. Click **Start**, point to **All Programs**, point to **Administrative Tools**, and then click **Active Directory Users and Computers**.
2. In the console tree, expand **DomainName**, where *DomainName* is the name of your domain.
3. Click the folder that contains the group.
4. In the right pane, right-click the group, and then click **Rename**.
5. Type a name for the new group, and then press ENTER.

## Appendix 132: Group Policy Configuration

For a Group Policy object, when you are on a workstation or server that is joined to a domain.

1. On the taskbar, click **Start**, point to **Run**, type **mmc**, and then click **OK**.
2. In the console, on the **File** menu, click **Add/Remove snap-in**.
3. In **Add/Remove Snap-in**, click **Add**, and then, in **Add Standalone Snap-in**, double-click **Group Policy Object Editor**.
4. In **Select Group Policy Object**, click **Browse**, browse to the policy object you would like to modify, and then click **Finish**.
5. Click **Close**, and then click **OK**.
6. In the console tree, click **Security Settings**.

### Where?

- o **GroupPolicyObject [ComputerName] Policy\Computer Configuration\Windows Settings\Security Settings**

7. Do one of the following:
  - To edit **Password Policy**, **Account Lockout Policy**, or **Kerberos Policy**, in the details pane, double-click **Account Policies**.
  - To edit **Audit Policy**, **User Rights Assignment**, or **Security Options**, in the details pane, double-click **Local Policies**.
  - To edit event log settings, on the console tree, click **Event Log**.
8. In the details pane, double-click the security setting that you want to modify.
9. (Optional) If this security setting has not yet been defined, select the **Define these policy settings** check box.
10. Modify the security setting and then click **OK**.

## Appendix 133: Firewall Configuration

## Appendix 134: Backup Configuration

The following section describes the step-by-step procedures for:

- Creating an Automated System Recovery (ASR) set
- Backing up your file and print servers

### Creating an ASR Set

You should use Backup to create an ASR set when you first place your server into production and again before and after any major changes to the system such as software and hardware upgrades. An ASR set is used as a last resort in system recovery, only after you have exhausted other options such as the startup options Safe Mode and Last Known Good Configuration.

### Requirements

- Credentials: To perform this procedure, you must be a member of either the Administrators or Backup Operators group on the local computer, or you must have been delegated the appropriate authority. If the computer is joined to a domain, members of the Domain Admins group will be able to perform this procedure.
- Tools: Backup. This procedure is only for file and print servers running Microsoft Windows Server 2003

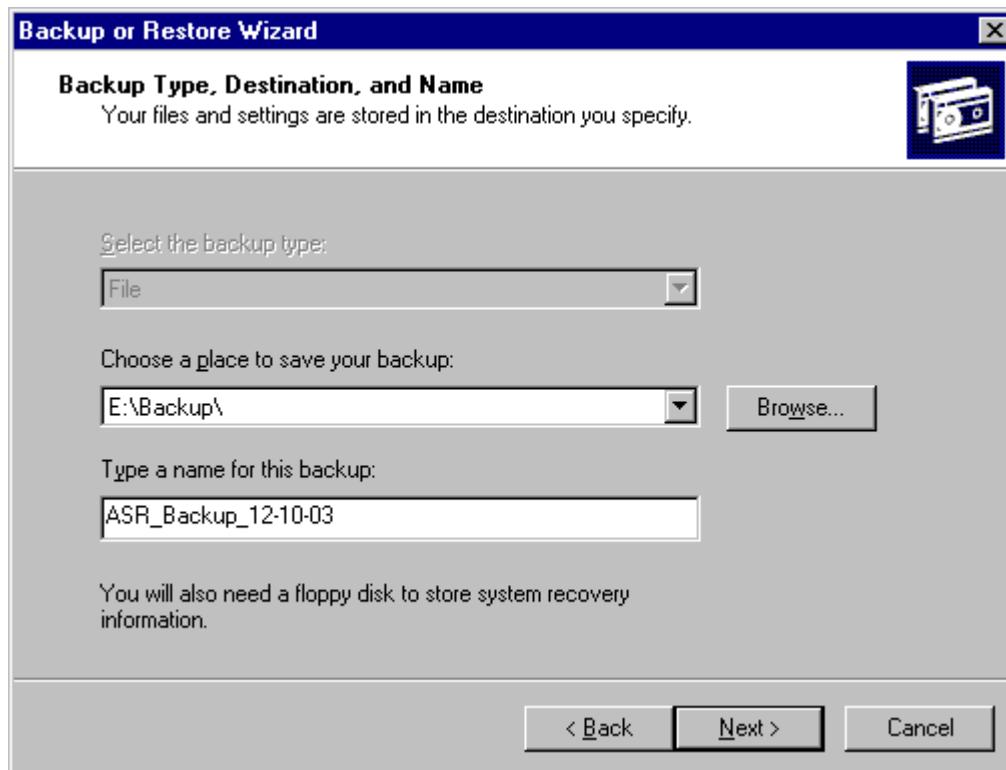
**Note:** Screenshots in this document reflect a test environment. The domain and server names in your environment might differ slightly from the ones shown in these screenshots.

#### To create an ASR set

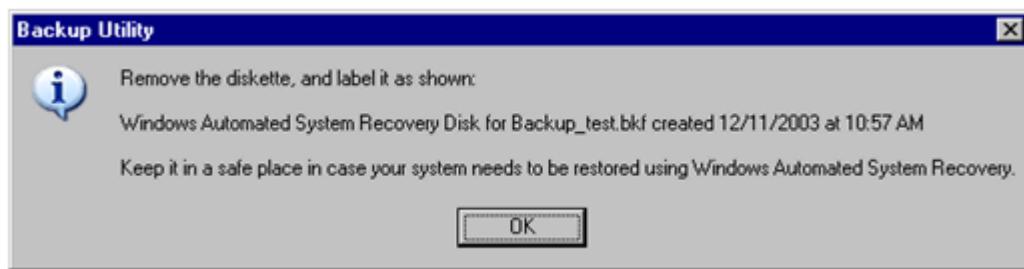
1. Click **Start**, click **Run**, type **ntbackup**, and then click **OK**.
2. The **Backup or Restore Wizard** will appear.

If you are an advanced user, you have the option to change backup and restore settings in **Advanced Mode**. Otherwise, click **Next**, to perform this procedure using the wizard.

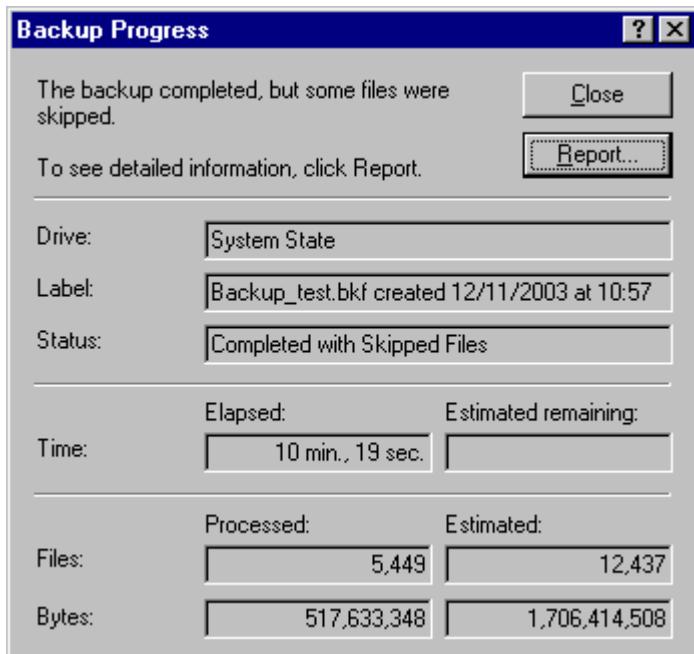
3. On the **Backup or Restore** wizard page, ensure **Back up files and settings** is selected, and then click **Next**.
4. On the **What to Back Up** page, ensure **All information on this computer** is selected, and then click **Next**.
5. On the **Backup Type, Destination, and Name** page, in **Select the backup type**, choose **File** if you want to back up files and folders to a file, or, if you want to back up files and folders to a tape, choose a tape device. In **Choose a place to save your backup**, click the drop-down menu or click **Browse** to choose a location to save your backup. In **Type a name for this backup**, type a descriptive name for the backup, and then click **Next**.



6. On the **Completing the Backup or Restore Wizard** page, verify that all of the information is correct, and then click **Finish** to start creating the ASR set. The process of creating the ASR set may take at least 15 minutes.
7. When the **Backup Utility** message appears, follow the directions and insert a 1.44 megabyte (MB) floppy disk into drive A, and then click **OK**. If your server does not have a floppy drive, you can still perform an ASR backup by copying the asr.sif and asrpnp.sif files located in `thesystemroot\repair` directory to another computer with a floppy drive, then copy those files onto a floppy disk. However, before running the ASR restore procedure, you must attach a floppy drive to your server.
8. When the **Backup Utility** message appears letting you know you can remove the floppy disk, make sure you label the disk with the information given.



9. When the backup is complete, the **Backup Progress** dialog box will indicate that the backup is finished. To view additional information about what happened during the backup process, click **Report** to open the backup report in Notepad. When you are finished, click **Close**.



10. After creating the ASR set, label this floppy disk and backup media carefully and keep them together. To use the backup media, you must have the floppy disk that you created with that set of media. You cannot use a floppy disk created at a different time or with a different set of media. You must also have your installation CD available at the time you perform Automated System Recovery.

Keep the ASR set in a secure location. The ASR set contains information about your system's configuration that could be used to do harm to your system.

#### Backing Up Your File and Print Servers

To protect your servers, you should schedule regular backups of all of the data. We recommend that you schedule a weekly normal backup of all of your data, including the system state data for the server. A normal backup will copy all the files you select and mark each file as having been backed up. In addition, we recommend you schedule a weekly differential backup. A differential backup copies files that have been created or changed since the last normal backup (the "differences").

#### Requirements

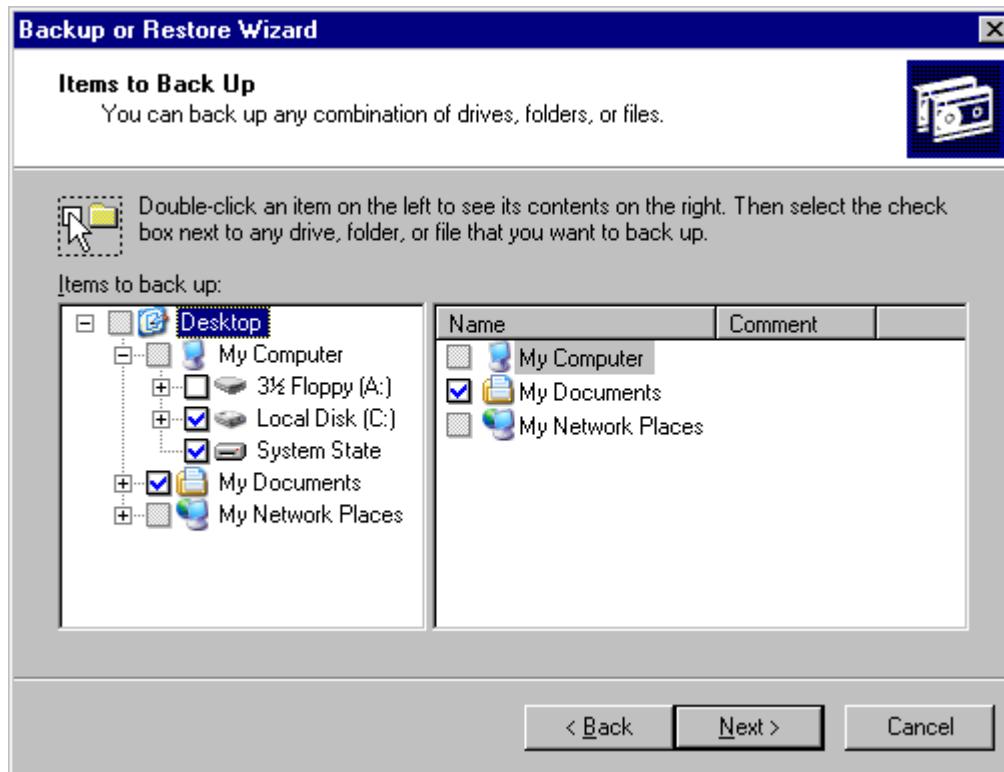
- Credentials: To perform this procedure, you must be a member of either the Administrators or Backup Operators group on the local computer, or you must have been delegated the appropriate authority. If the computer is joined to a domain, members of the Domain Admins group will be able to perform this procedure.
- Tools: Backup.

#### To schedule a weekly normal backup

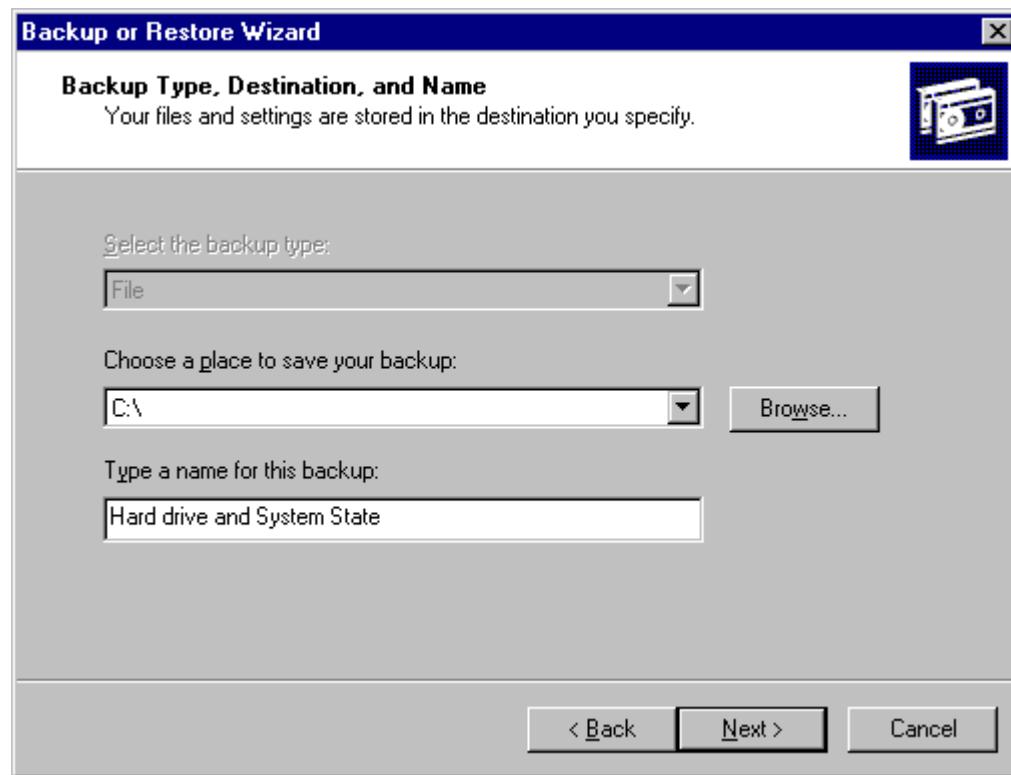
1. Click **Start**, click **Run**, type **ntbackup**, and then click **OK**.
2. The **Backup or Restore Wizard** will appear. Click **Next**.
3. On the **Backup or Restore** wizard page, ensure **Back up files and settings** is selected, and then click **Next**.
4. On the **What to Back Up** page, click **Let me choose what to back up**, and then click **Next**.

To include all data on your computer in the scheduled backup, click **All information on this computer**.

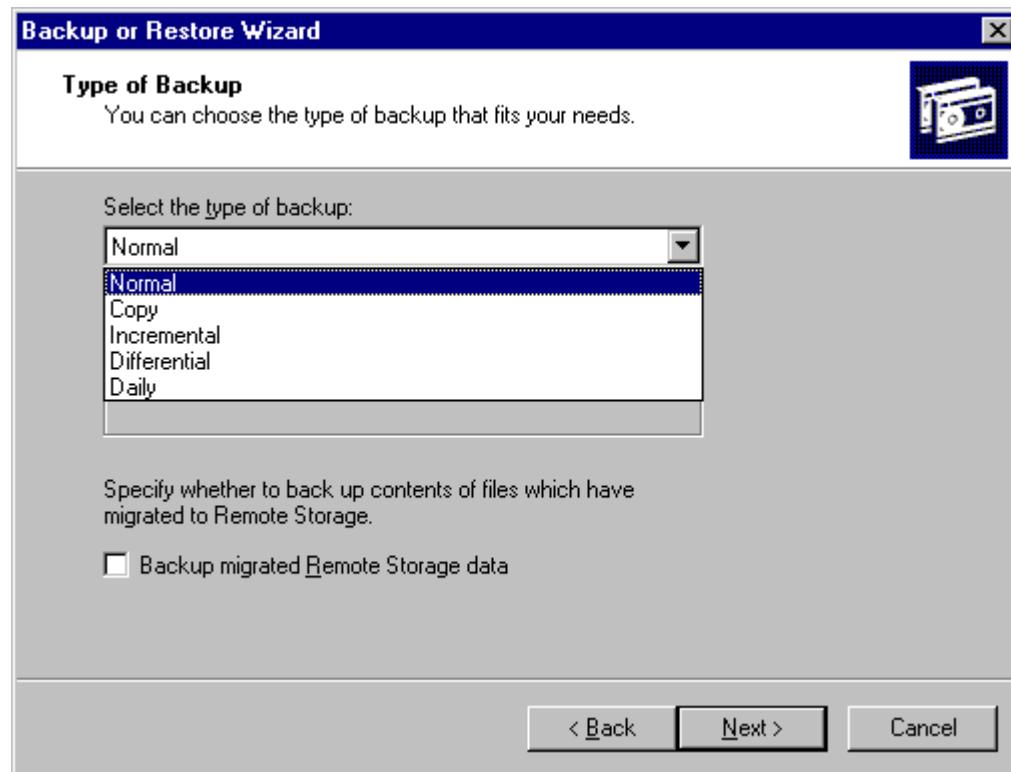
5. On the **Items to Back Up** page, click the items to expand their contents. Select the check boxes for any drives or folders that contain data that should be backed up on a regular basis, and then click **Next**.



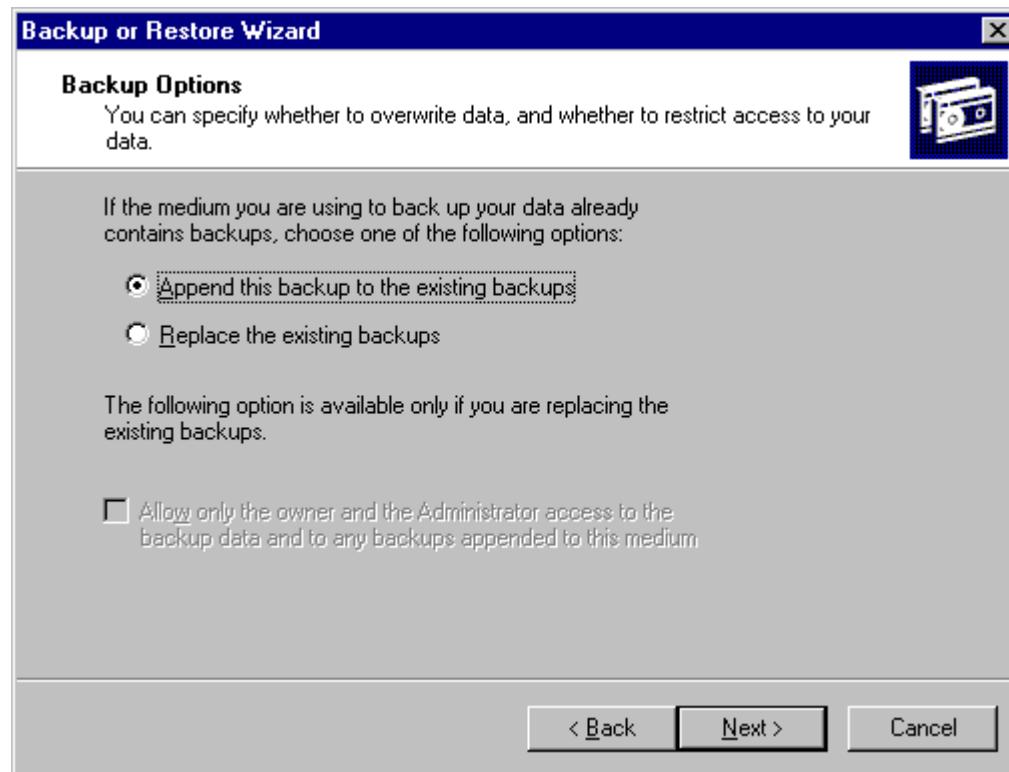
6. On the **Backup Type, Destination, and Name** page, in **Choose a place to save your backup**, click the drop-down menu or click **Browse** to choose a location to save your backup. In **Type a name for this backup**, type a descriptive name for the backup, and then click **Next**.



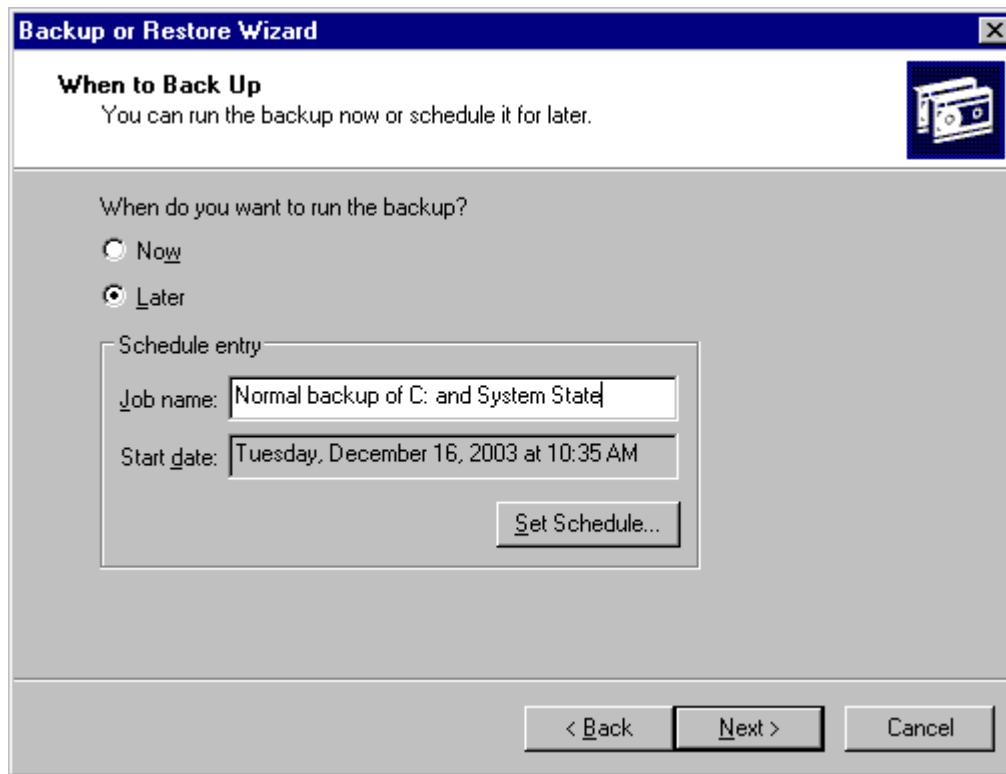
7. On the **Completing the Backup or Restore Wizard** page, click **Advanced**.
8. On the **Type of Backup** page, in the drop-down menu, click **Normal**, and then click **Next**.



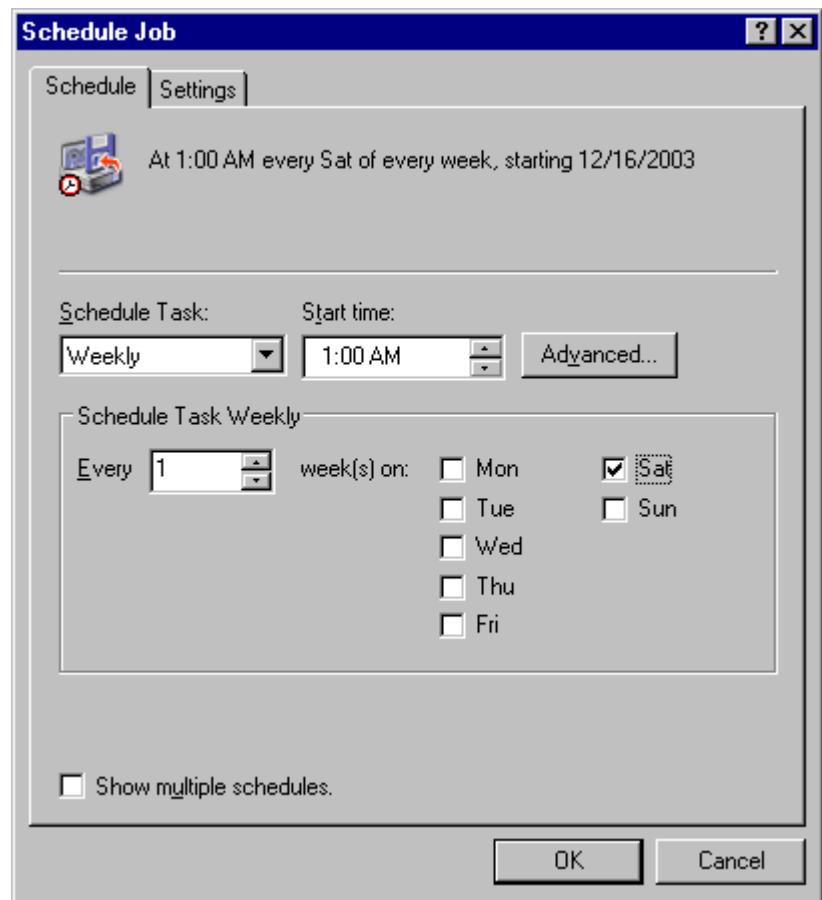
9. On the **How to Back Up** page, select the **Verify data after backup** check box, and then click **Next**.
10. On the **Backup Options** page, ensure the **Append this backup to the existing backups** option is selected, and then click **Next**.



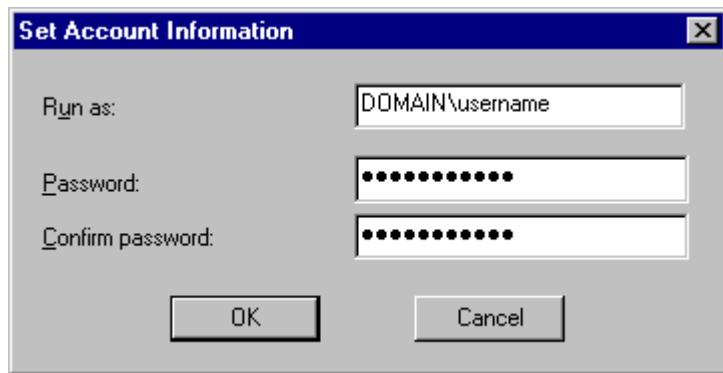
11. On the **When to Back Up** page, under **When do you want to run the backup**, click **Later**.
12. Under **Schedule entry**, type a descriptive name in **Job name**, and then click **Set Schedule**.



13. In the **Schedule Job** dialog box, in **Schedule Task**, click **Weekly** in the drop-down menu.
14. In **Start time**, use the up and down arrows to select the appropriate time for the backup to start. Click **Advanced** to specify a start date and an end date for the scheduled task or to specify whether the scheduled task runs repeatedly at a particular interval.
15. Under **Schedule Task Weekly**, select one or more days when you would like to have a backup created, and then click **OK**.



16. In the **Set Account Information** dialog box, in **Run as**, type the domain or workgroup and user name of the account that is authorized to perform backup and restore operations. Use the format *domain\username* or *workgroup\username*. In **Password**, type the password for the user account. Retype the password in **Confirm password**, and then click **OK**.



You need to update the password specified in the scheduled task anytime the account's password changes or expires to ensure the backup job runs as scheduled.

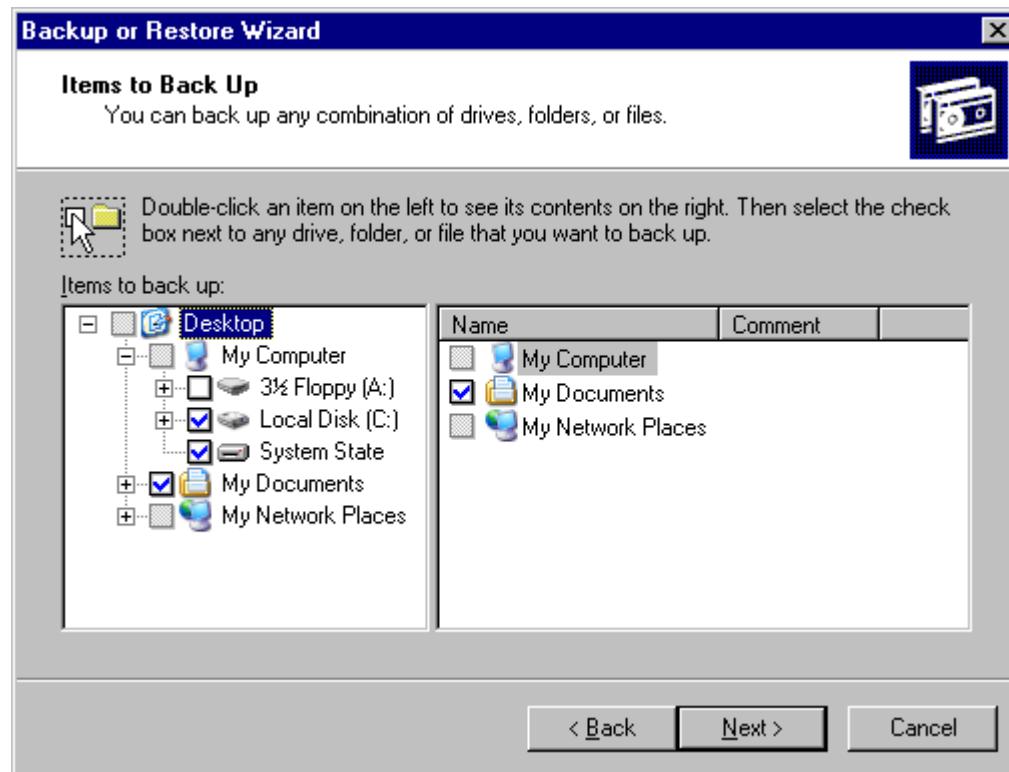
17. On the **Completing the Backup or Restore Wizard** page, confirm the settings, and then click **Finish**.

**Notes:** We recommend creating a summary backup log which, when regularly reviewed, will help ensure that the backup was successfully completed. To do this, click the **Tools** menu, and then click **Options**. On the **Backup Log** tab, select **Summary**.

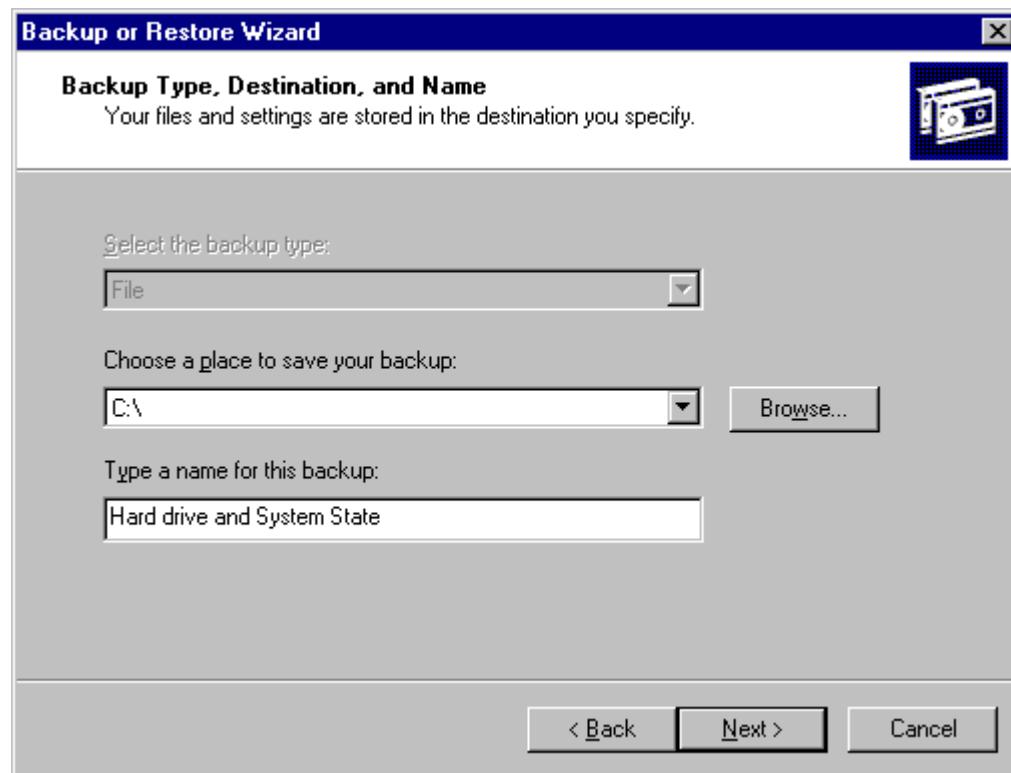
If it's determined that the backup is not occurring, review the status of the scheduled task for possible reasons. To review scheduled tasks, click **Start**, click **Control Panel**, and then double-click **Scheduled Tasks**.

#### To schedule a weekly differential backup

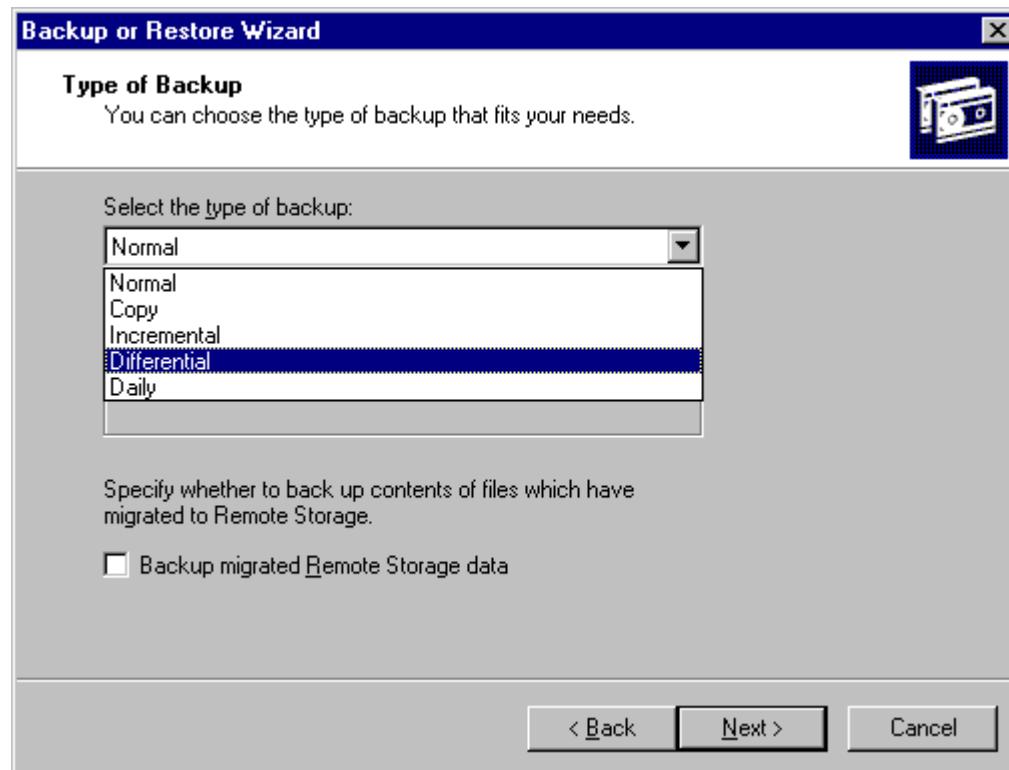
1. Click **Start**, click **Run**, type **ntbackup**, and then click **OK**.
2. The **Backup or Restore Wizard** will appear. Click **Next**.
3. On the **Backup or Restore** wizard page, ensure **Back up files and settings** is selected, and then click **Next**.
4. On the **What to Back Up** page, click **Let me choose what to back up**, and then click **Next**.
5. On the **Items to Back Up** page, click the items to expand their contents. Select the **System State** check box and select other check boxes for any drives or folders that contain data that should be backed up on a regular basis, and then click **Next**.



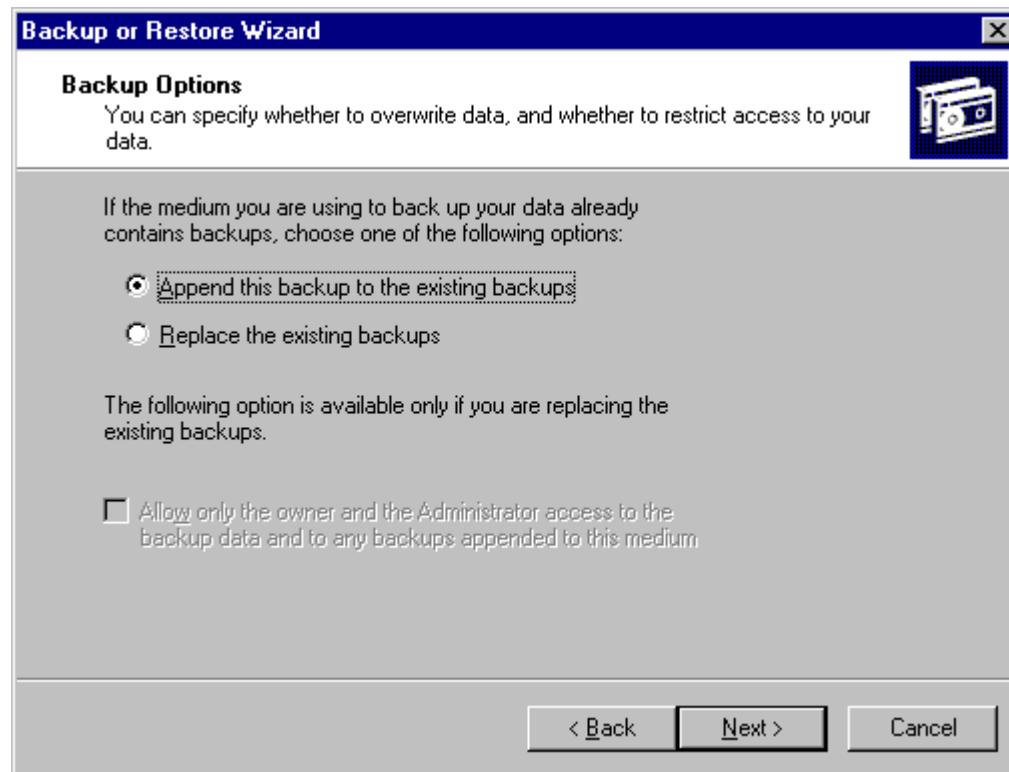
6. On the **Backup Type, Destination, and Name** page, in **Choose a place to save your backup**, click the drop-down menu or click **Browse** to choose a location to save your backup. In **Type a name for this backup**, type a descriptive name for the backup, and then click **Next**.



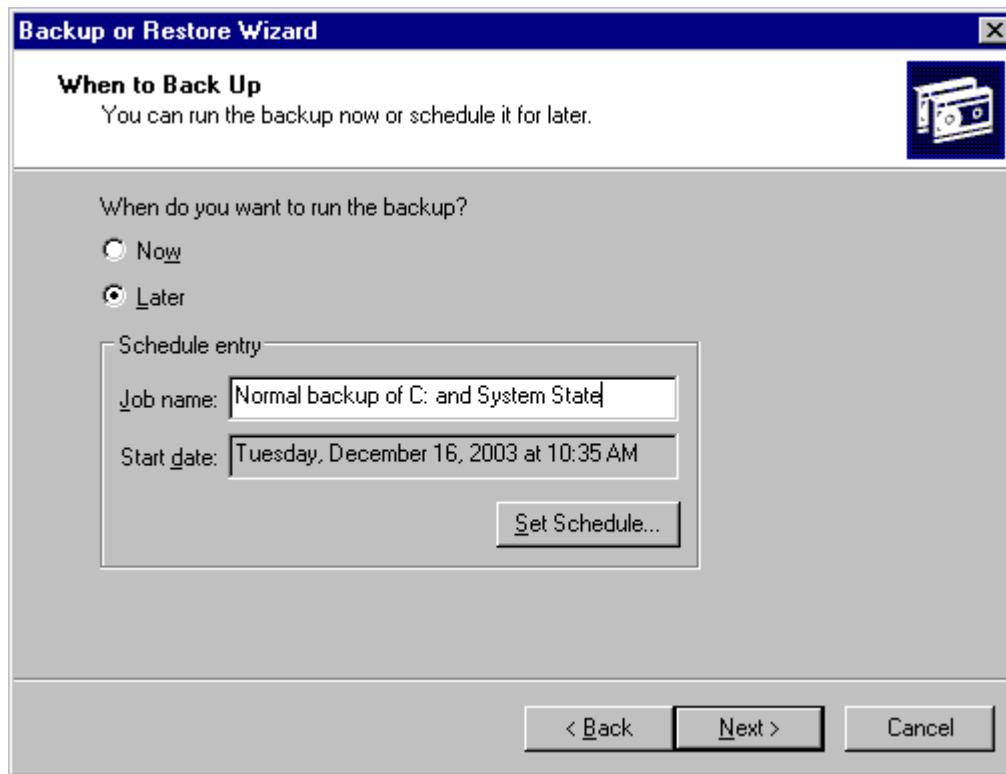
7. On the **Completing the Backup or Restore Wizard** page, click **Advanced**.
8. On the **Type of Backup** page, in **Select the type of backup**, click **Differential**, and then click **Next**.



9. On the **How to Back Up** page, select the **Verify data after backup** check box, and then click **Next**.
10. On the **Backup Options** page, ensure the **Append this backup to the existing backups** option is selected, and then click **Next**.



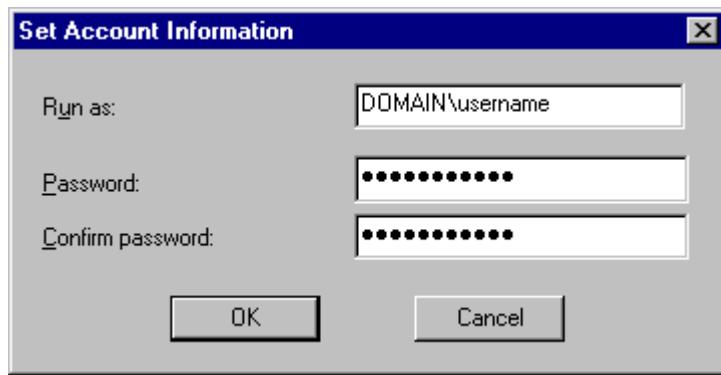
11. On the **When to Back Up** page, under **When do you want to run the backup**, click **Later**. Under **Schedule entry**, type a descriptive name in **Job name**, and then click **Set Schedule**.



12. In the **Schedule Job** dialog box, in **Schedule Task**, select **Weekly** from the drop-down menu.
13. In **Start time**, use the up and down arrows to select the appropriate time for the backup to start, and then select the days you want the differential backup to run each week. It is recommended that you schedule a differential backup on the days that a normal backup is not run. Click **Advanced** to specify a start date and an end date for the scheduled task or to specify whether the scheduled task runs repeatedly at a particular interval. Click **OK** when finished.



14. In the **Set Account Information** dialog box, in **Run as**, type the domain or workgroup and user name of the account that is authorized to perform backup and restore operations. Use the format *domain\username* or *workgroup\username*. In **Password**, type the password for the user account. Retype the same password in **Confirm password**, and then click **OK**.



You need to update the password specified in the scheduled task anytime the account's password changes or expires to ensure the backup job runs as scheduled.

15. On the **Completing the Backup or Restore Wizard** page, confirm your settings, and then click **Finish**.

**Notes:** We recommend creating a summary backup log which, when regularly reviewed, will ensure that the backup was successfully completed. To do this, click the **Tools** menu, and then click **Options**. On the **Backup Log** tab, select **Summary**.

If it's determined that the backup is not occurring, review the status of the scheduled task for possible reasons. To review scheduled tasks, click **Start**, click **Control Panel**, and then double-click **Scheduled Tasks**.

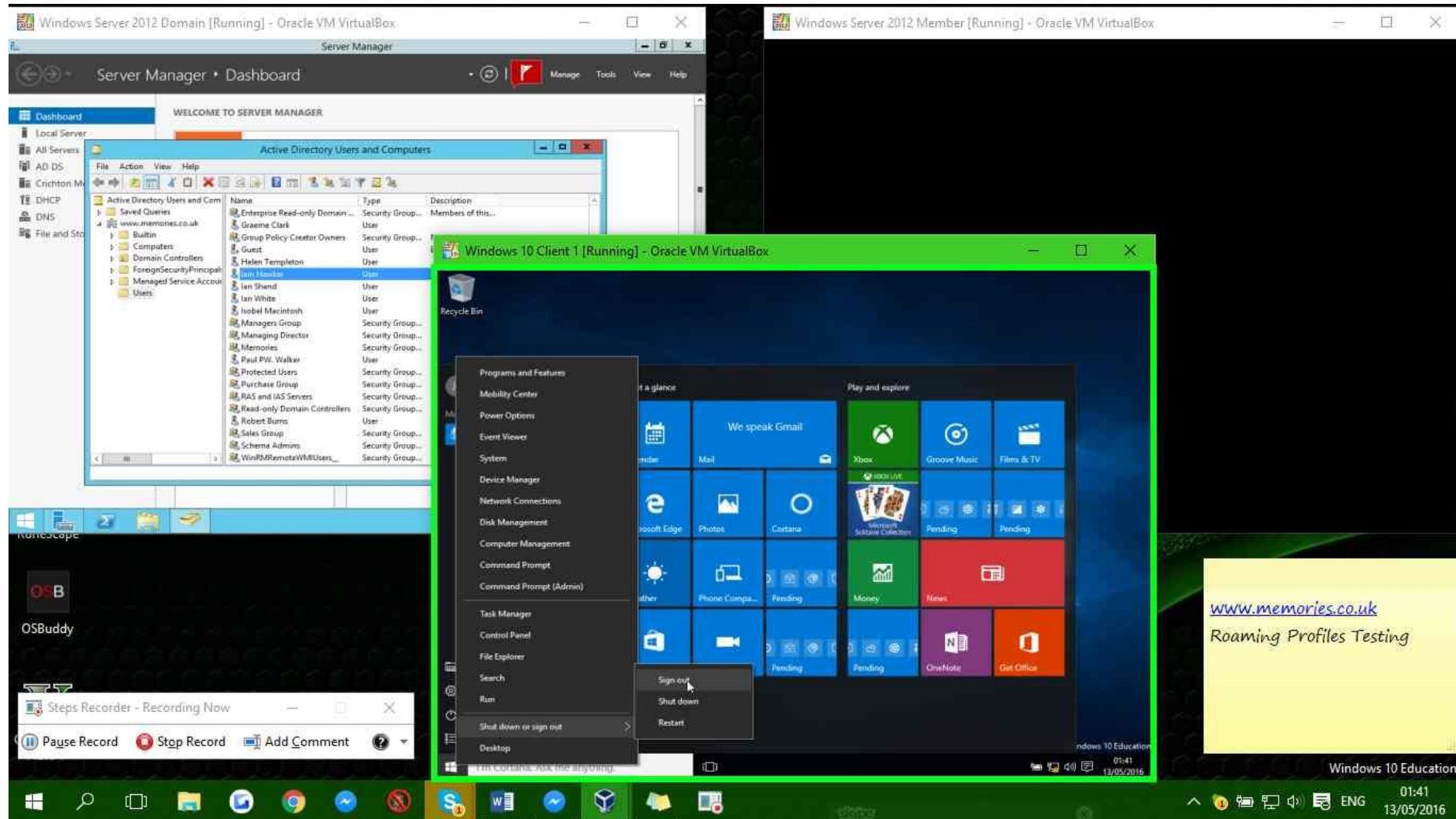
## Testing the implemented solution - Appendices

Testing records:

### Appendix 135: Testing – Logbook

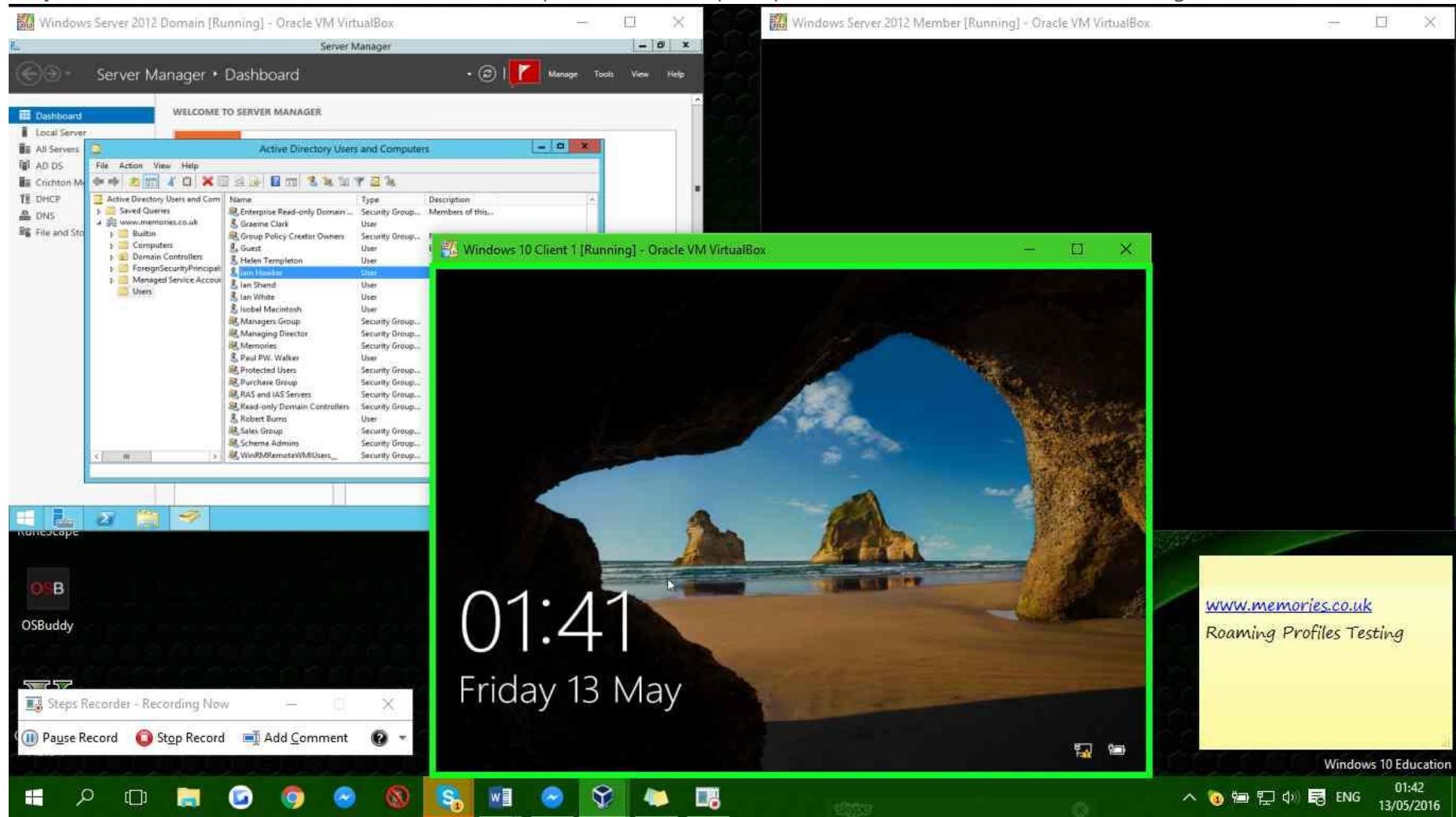
Test	Expected Result	Actual Result
Roaming Profiles		
Does the Folder Share work?	Pass	Pass
Can the Profiles login via Domain?	Pass	Pass
Are the Profiles listed as “Roaming”?	Pass	Pass
Can the Profiles load details on another Client?	Pass	Pass
User Quotas		

## Appendix 136: Users & Groups – Roaming Profile PSR



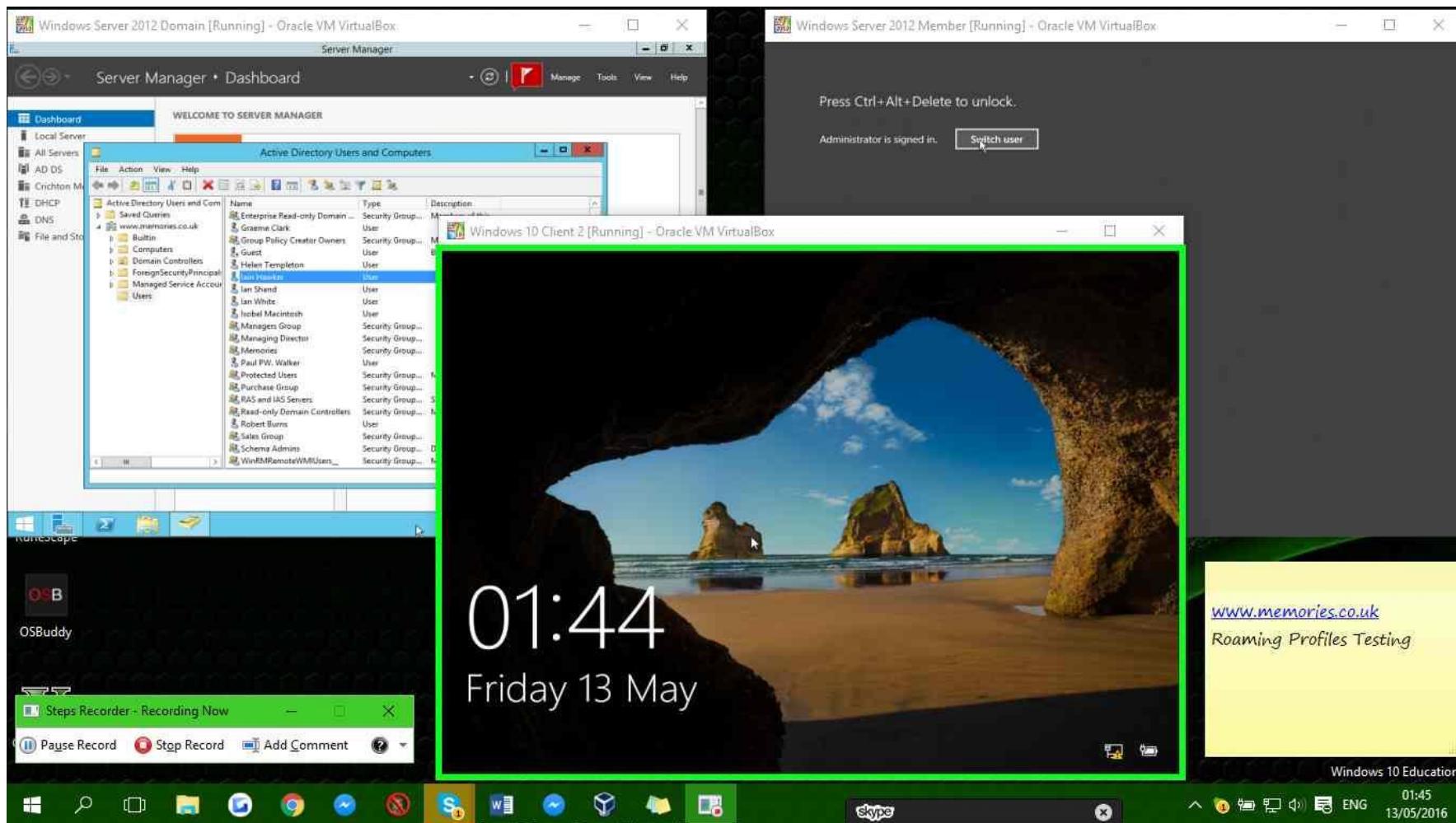
Previous Next

Step 26: (13/05/2016 01:42:02) User left click on "qt\_scrollarea\_viewport (pane)" in "Windows 10 Client 1 [Running] - Oracle VM VirtualBox"



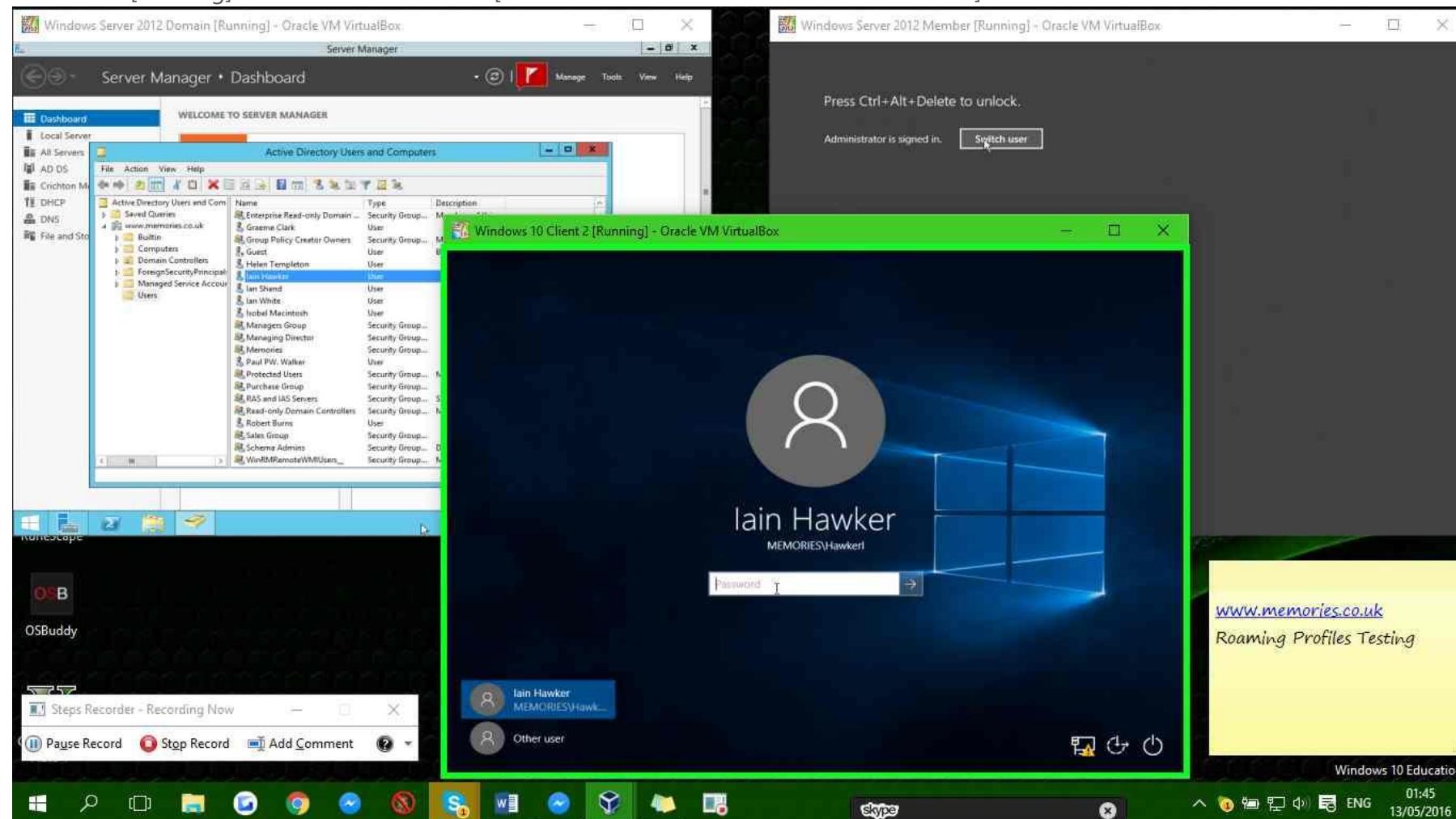
Previous Next

**Step 27: (13/05/2016 01:45:20)** User left click on "qt\_scrollarea\_viewport (pane)" in "Windows 10 Client 2 [Running] - Oracle VM VirtualBox"



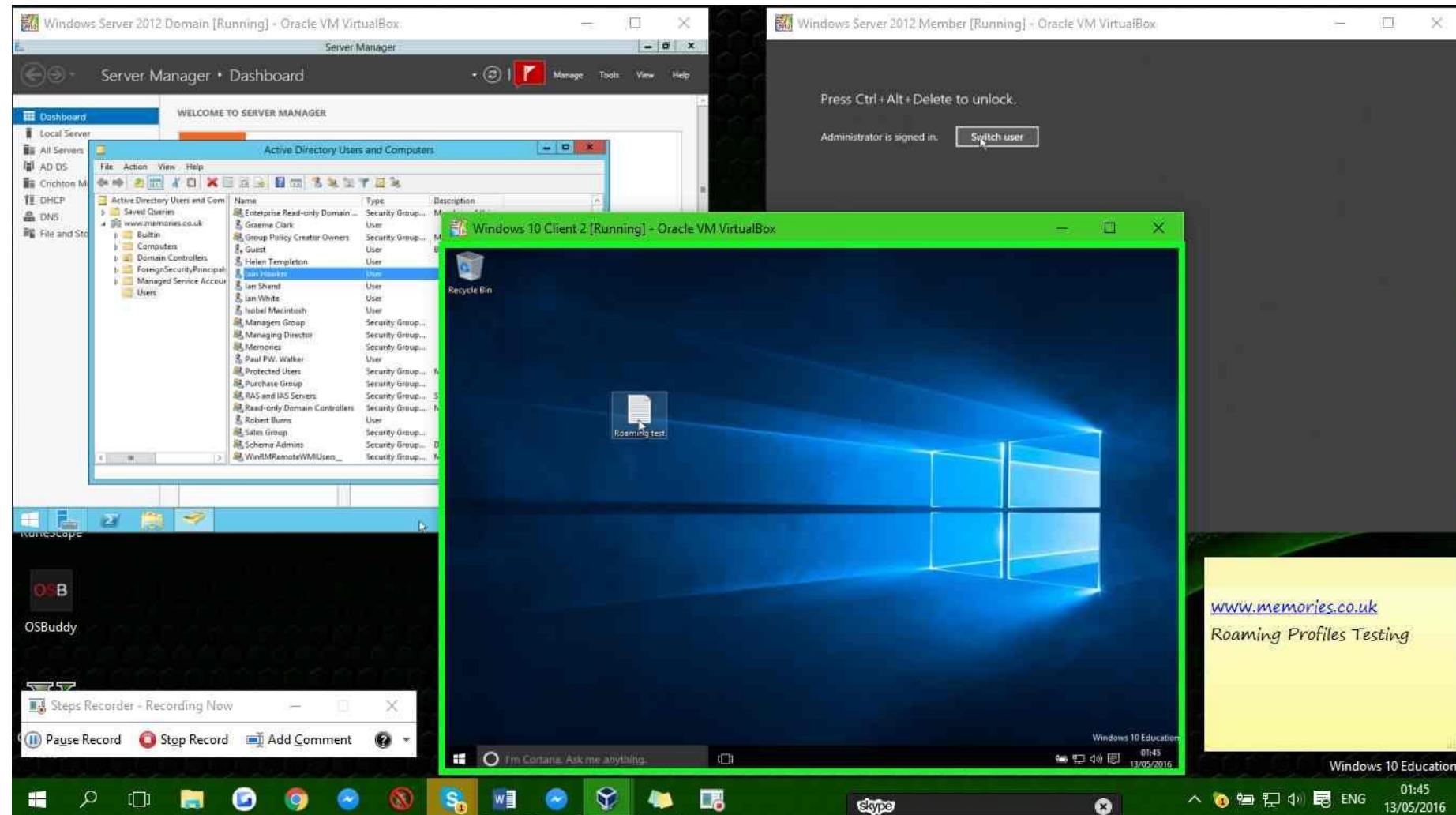
[Previous](#) [Next](#)

**Step 28: (13/05/2016 01:45:31) User keyboard input on "Windows 10 Client 2 [Running] - Oracle VM VirtualBox (window)" in "Windows 10 Client 2 [Running] - Oracle VM VirtualBox" [CAPSLOCK CAPSLOCK CAPSLOCK CAPSLOCK]**



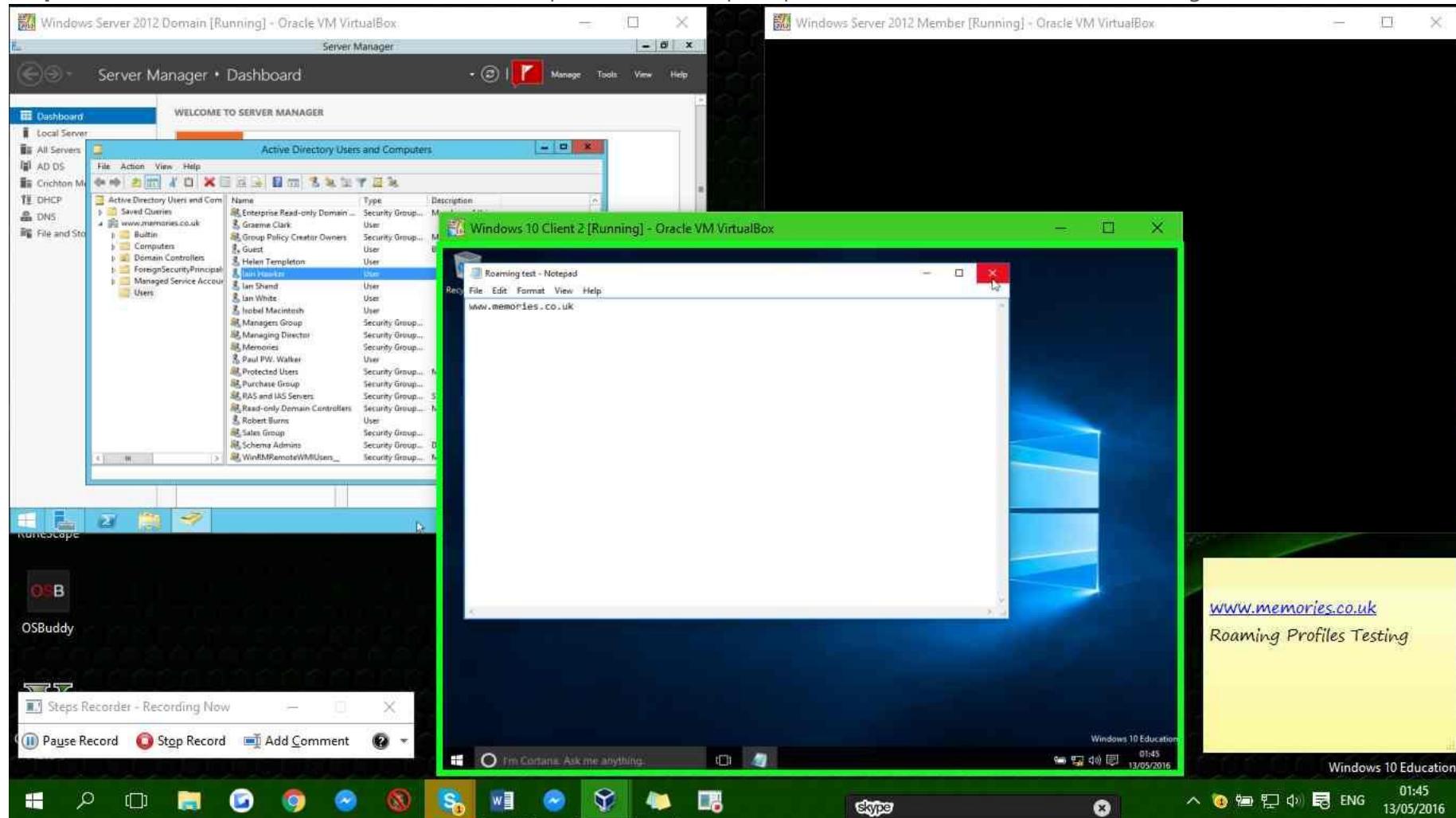
[Previous](#) [Next](#)

**Step 29: (13/05/2016 01:45:54)** User left double click on "qt\_scrollarea\_viewport (pane)" in "Windows 10 Client 2 [Running] - Oracle VM VirtualBox"



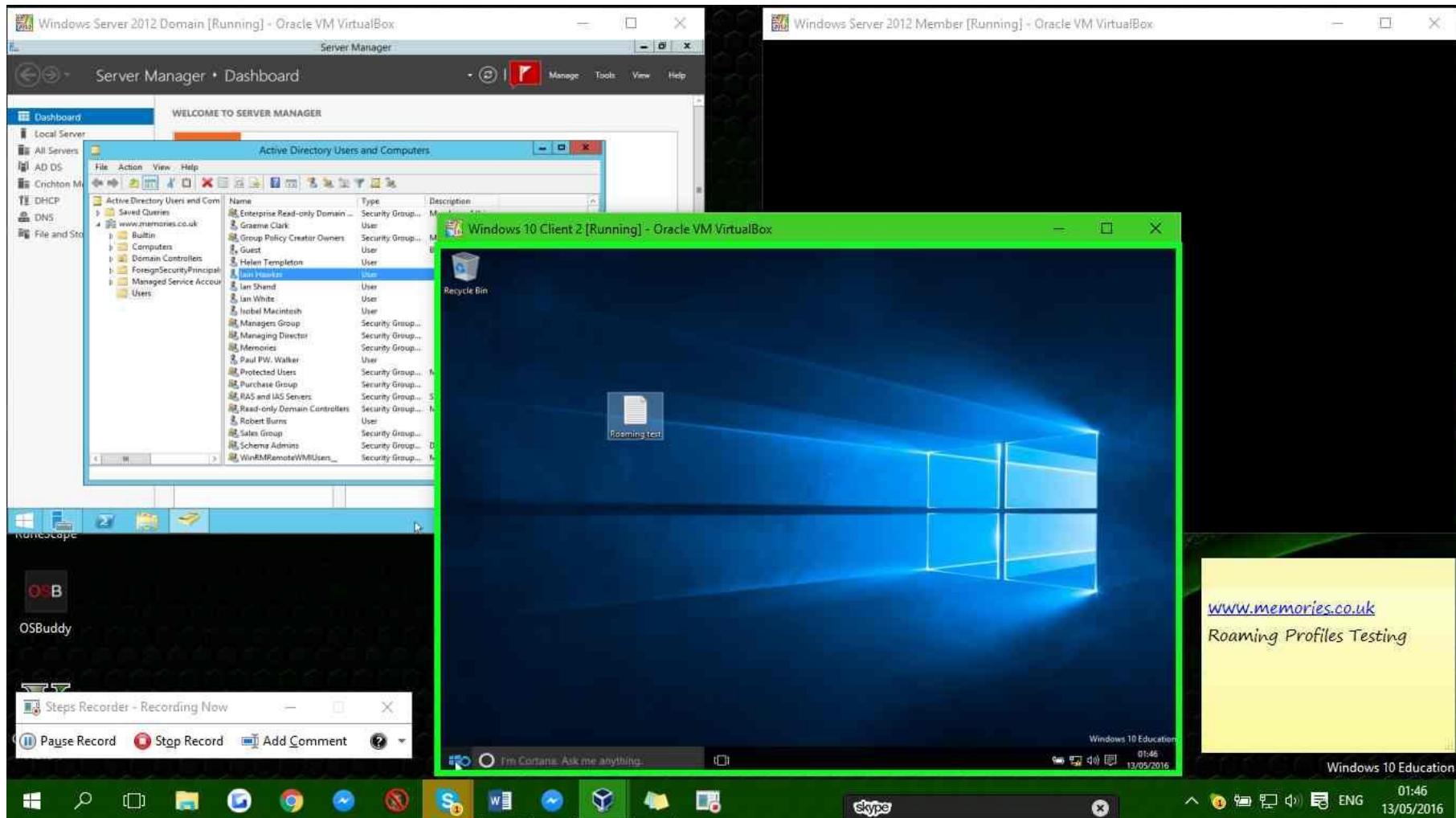
[Previous](#) [Next](#)

Step 30: (13/05/2016 01:46:00) User left click on "qt\_scrollarea\_viewport (pane)" in "Windows 10 Client 2 [Running] - Oracle VM VirtualBox"



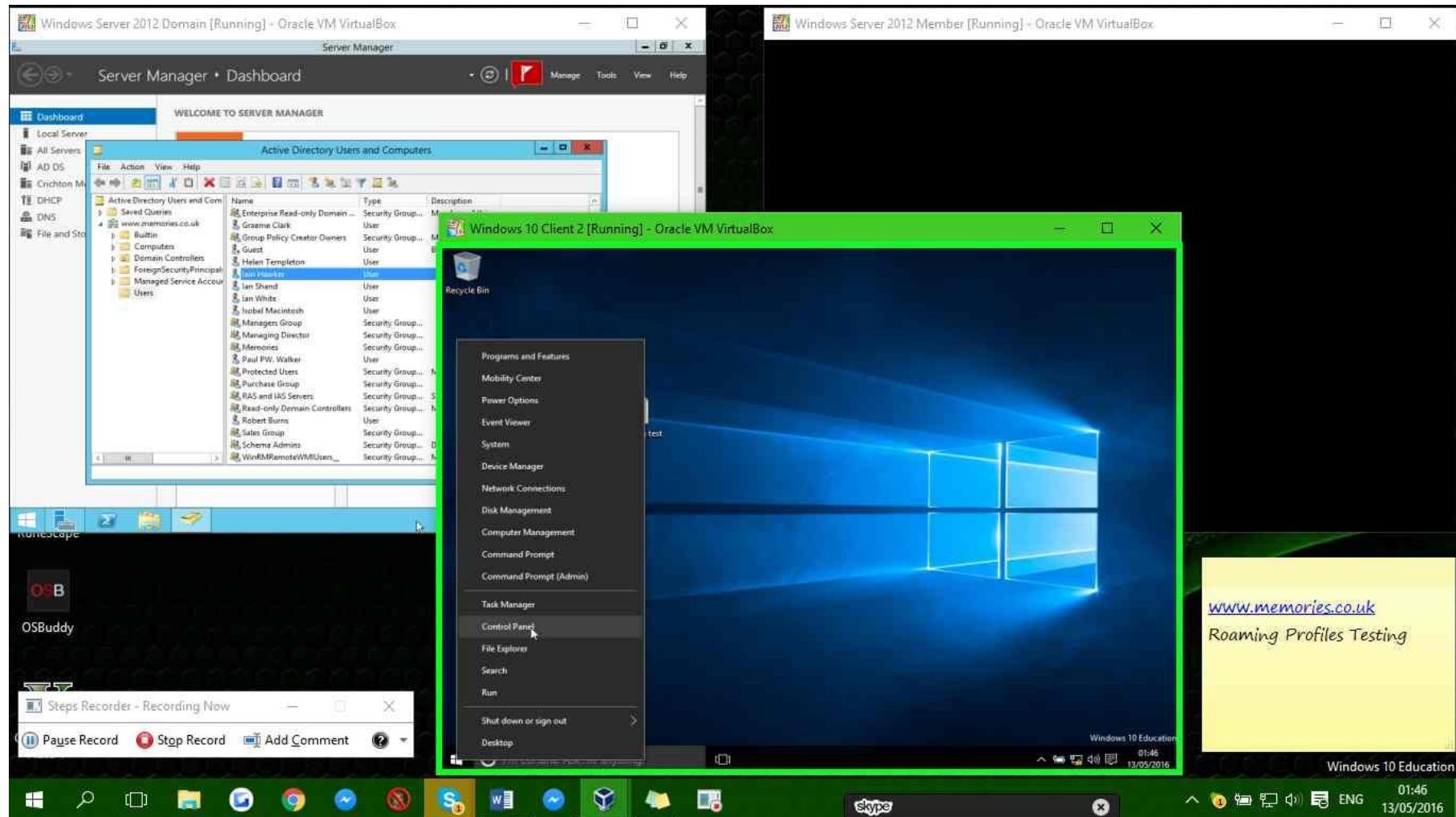
[Previous](#) [Next](#)

**Step 31: (13/05/2016 01:46:03)** User right click on "qt\_scrollarea\_viewport (pane)" in "Windows 10 Client 2 [Running] - Oracle VM VirtualBox"



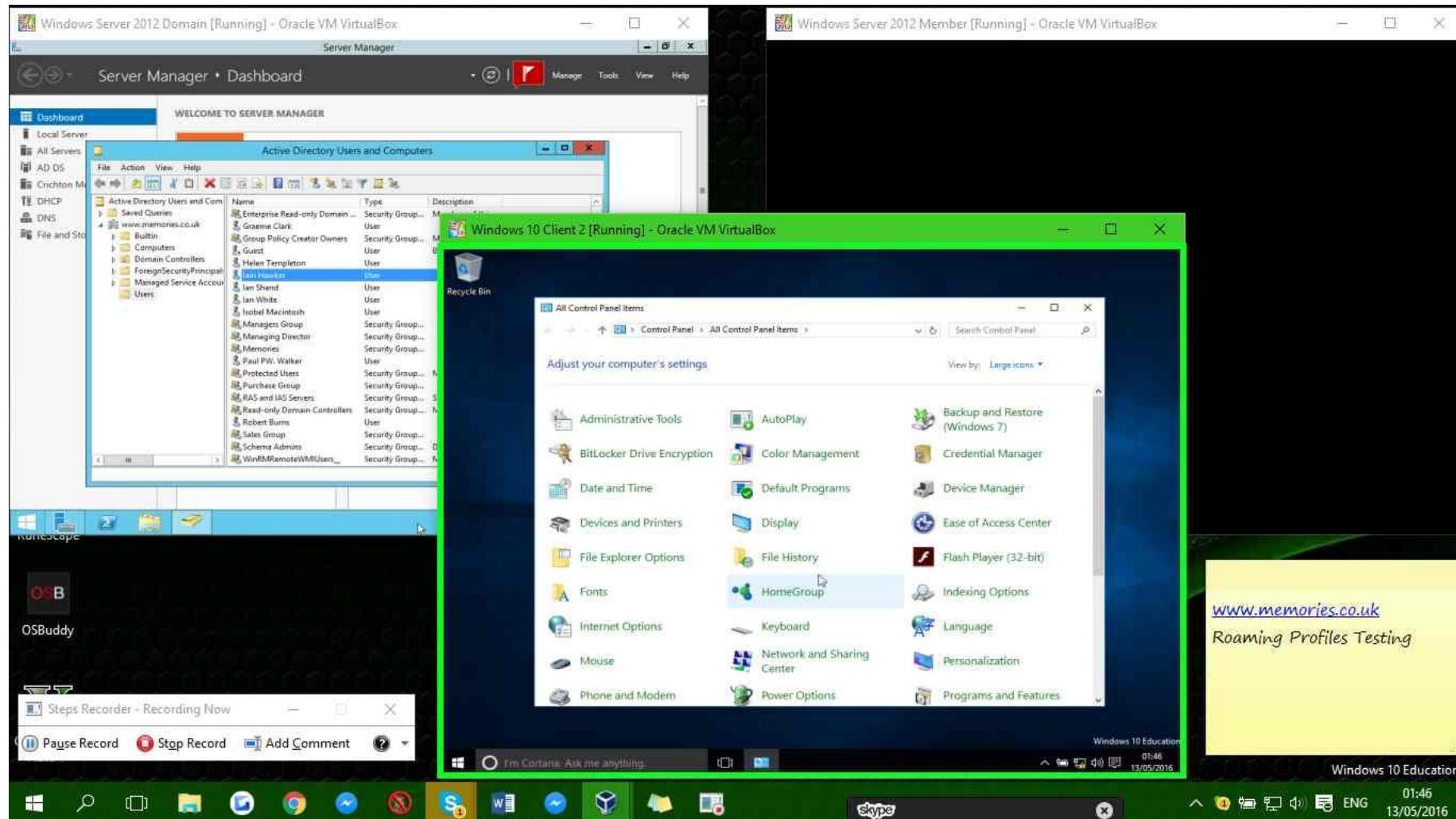
[Previous](#) [Next](#)

**Step 32: (13/05/2016 01:46:07)** User left click on "qt\_scrollarea\_viewport (pane)" in "Windows 10 Client 2 [Running] - Oracle VM VirtualBox"



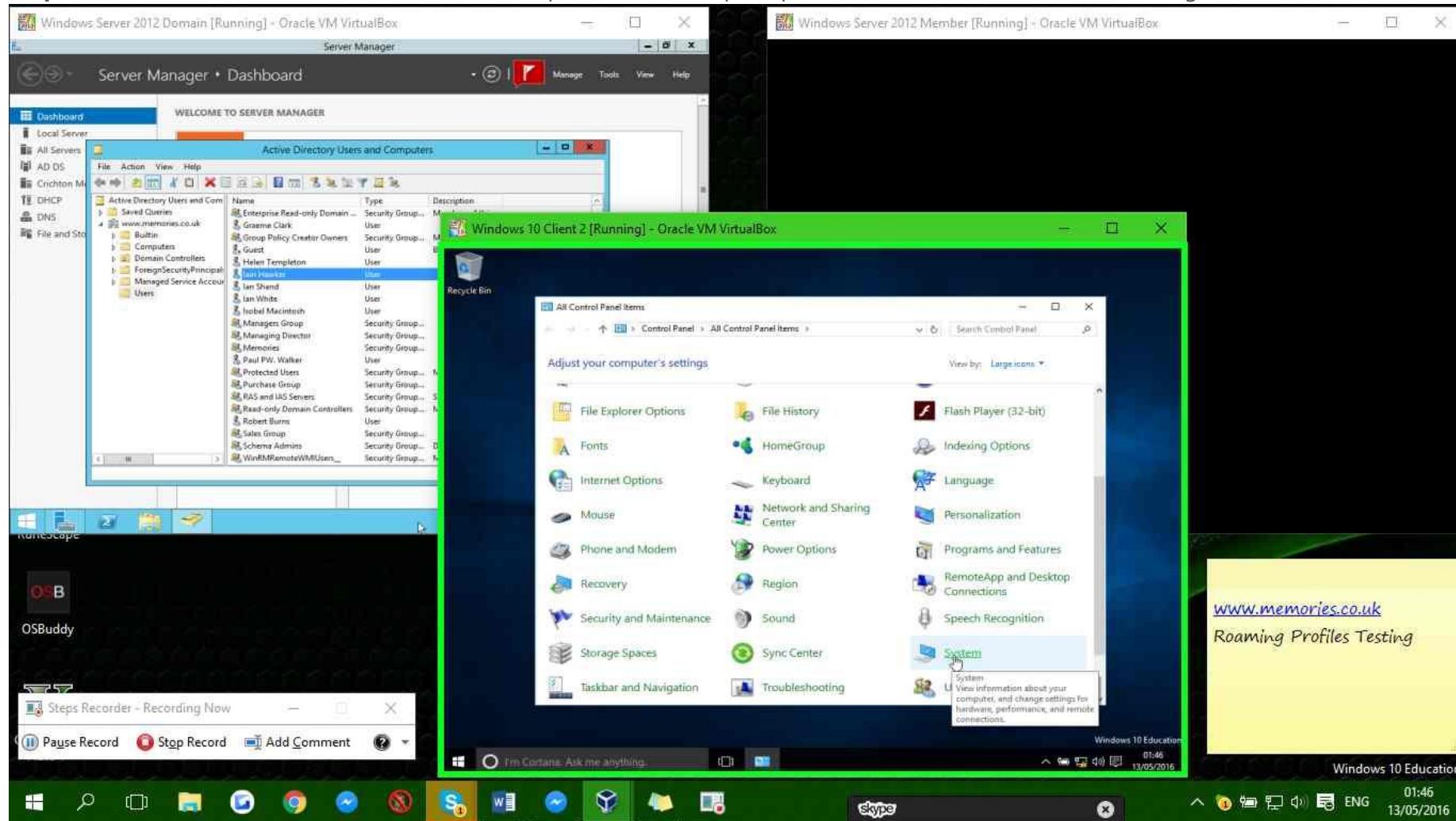
[Previous](#) [Next](#)

**Step 33: (13/05/2016 01:46:15) User mouse wheel down on "qt\_scrollarea\_viewport (pane)" in "Windows 10 Client 2 [Running] - Oracle VM VirtualBox"**



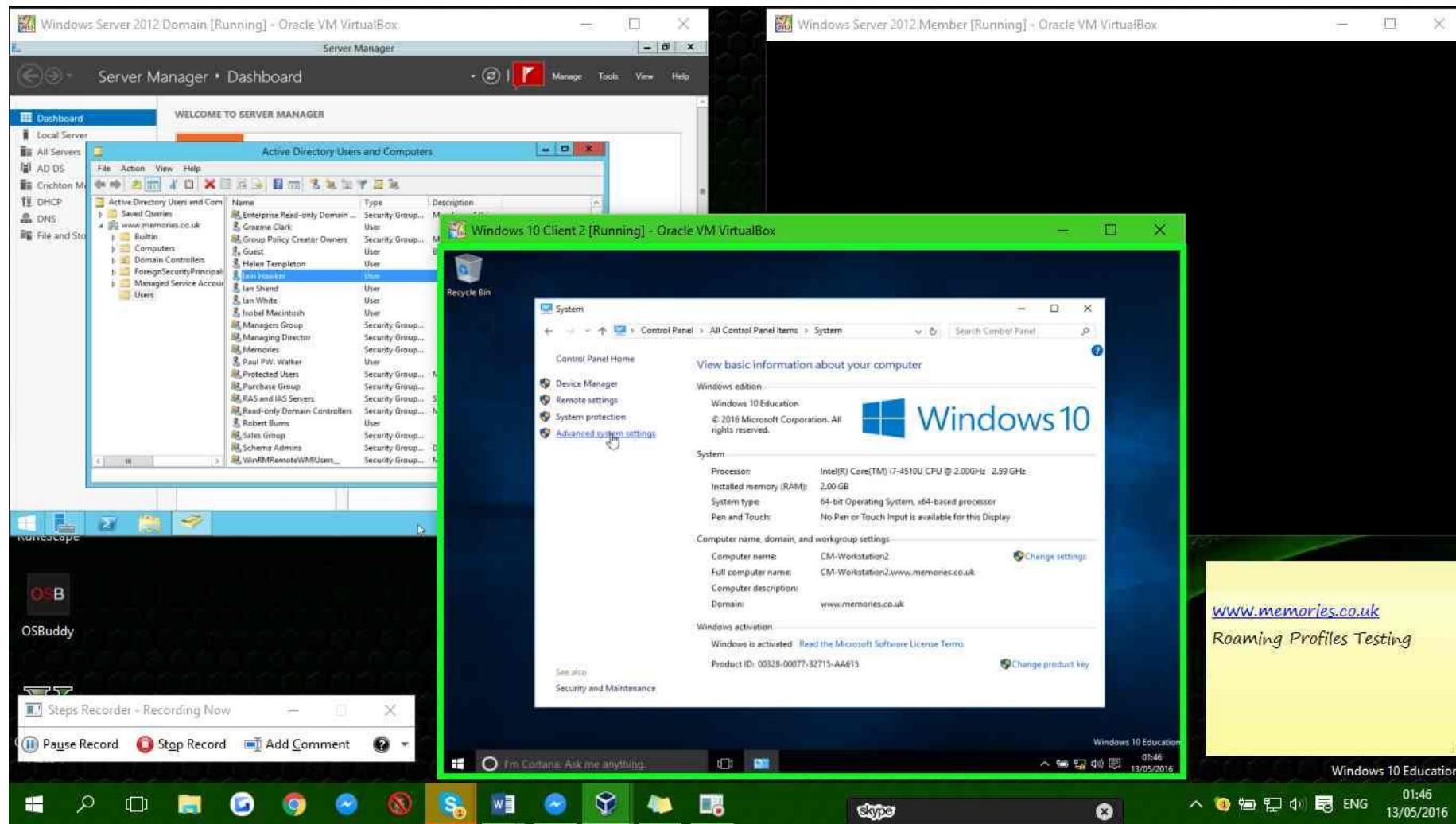
[Previous](#) [Next](#)

**Step 34: (13/05/2016 01:46:20)** User left click on "qt\_scrollarea\_viewport (pane)" in "Windows 10 Client 2 [Running] - Oracle VM VirtualBox"



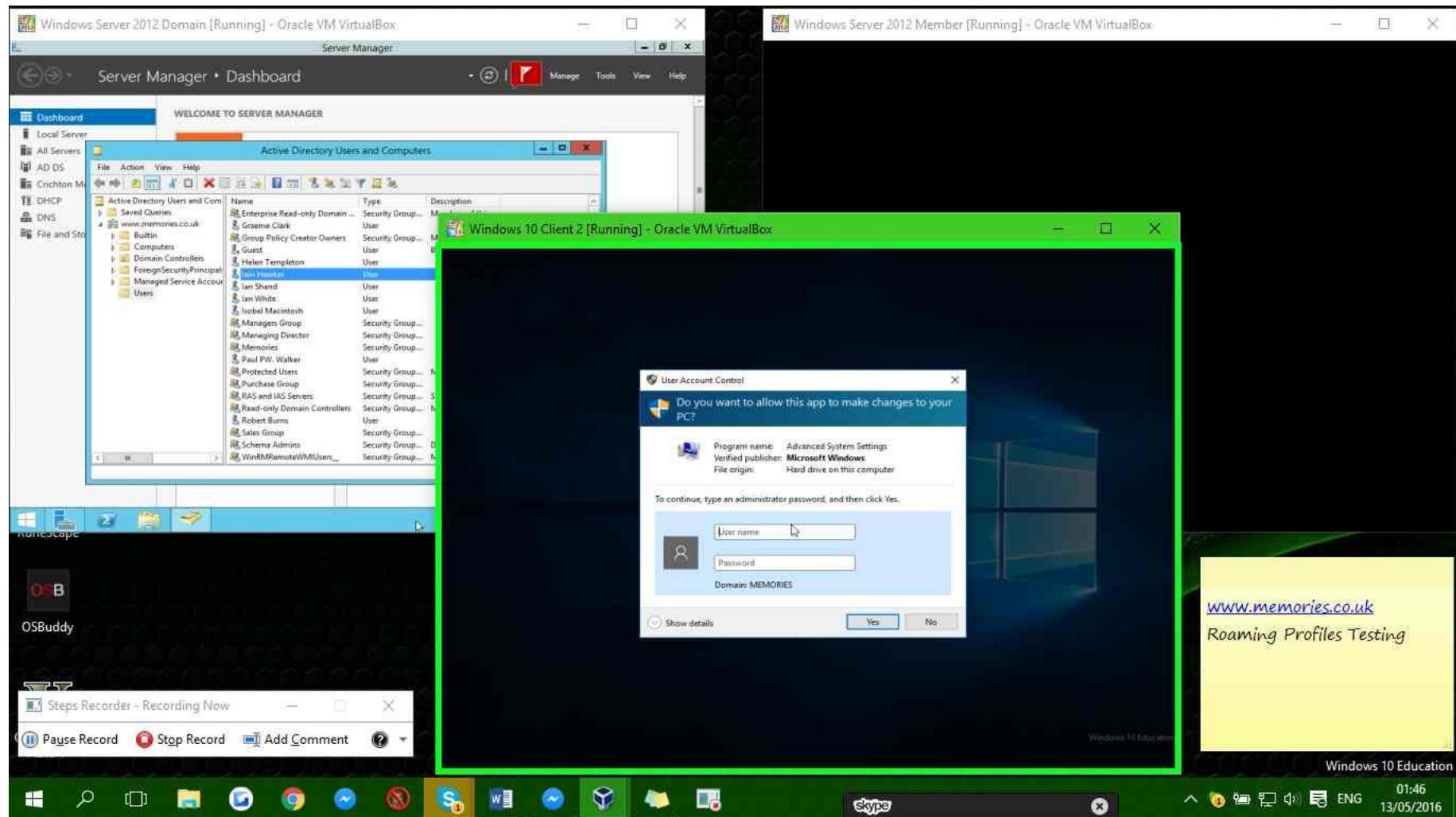
Previous Next

**Step 35: (13/05/2016 01:46:24)** User left click on "qt\_scrollarea\_viewport (pane)" in "Windows 10 Client 2 [Running] - Oracle VM VirtualBox"



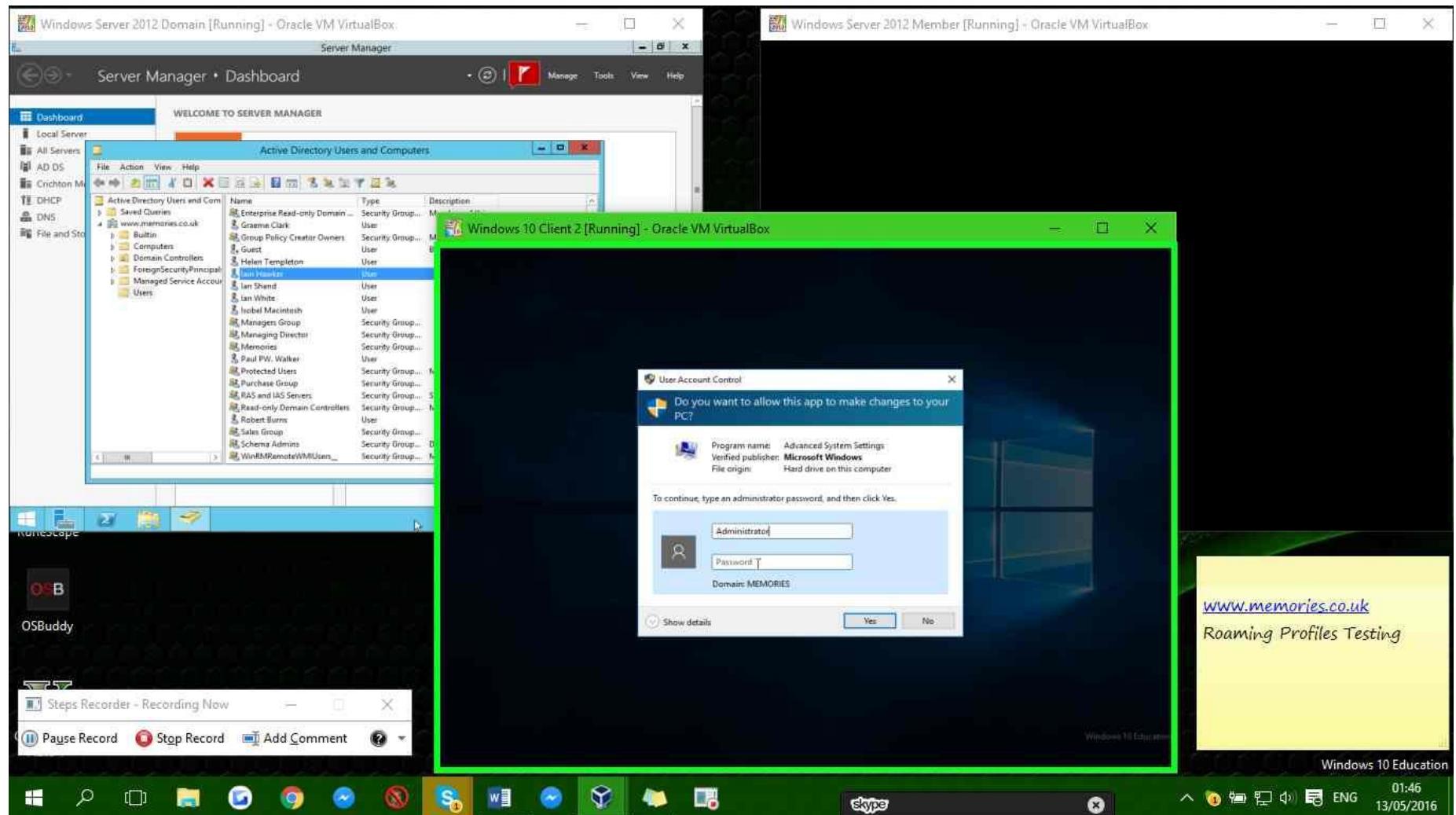
Previous Next

**Step 36: (13/05/2016 01:46:29)** User keyboard input on "Windows 10 Client 2 [Running] - Oracle VM VirtualBox (window)" in "Windows 10 Client 2 [Running] - Oracle VM VirtualBox" [CAPSLOCK CAPSLOCK CAPSLOCK CAPSLOCK]



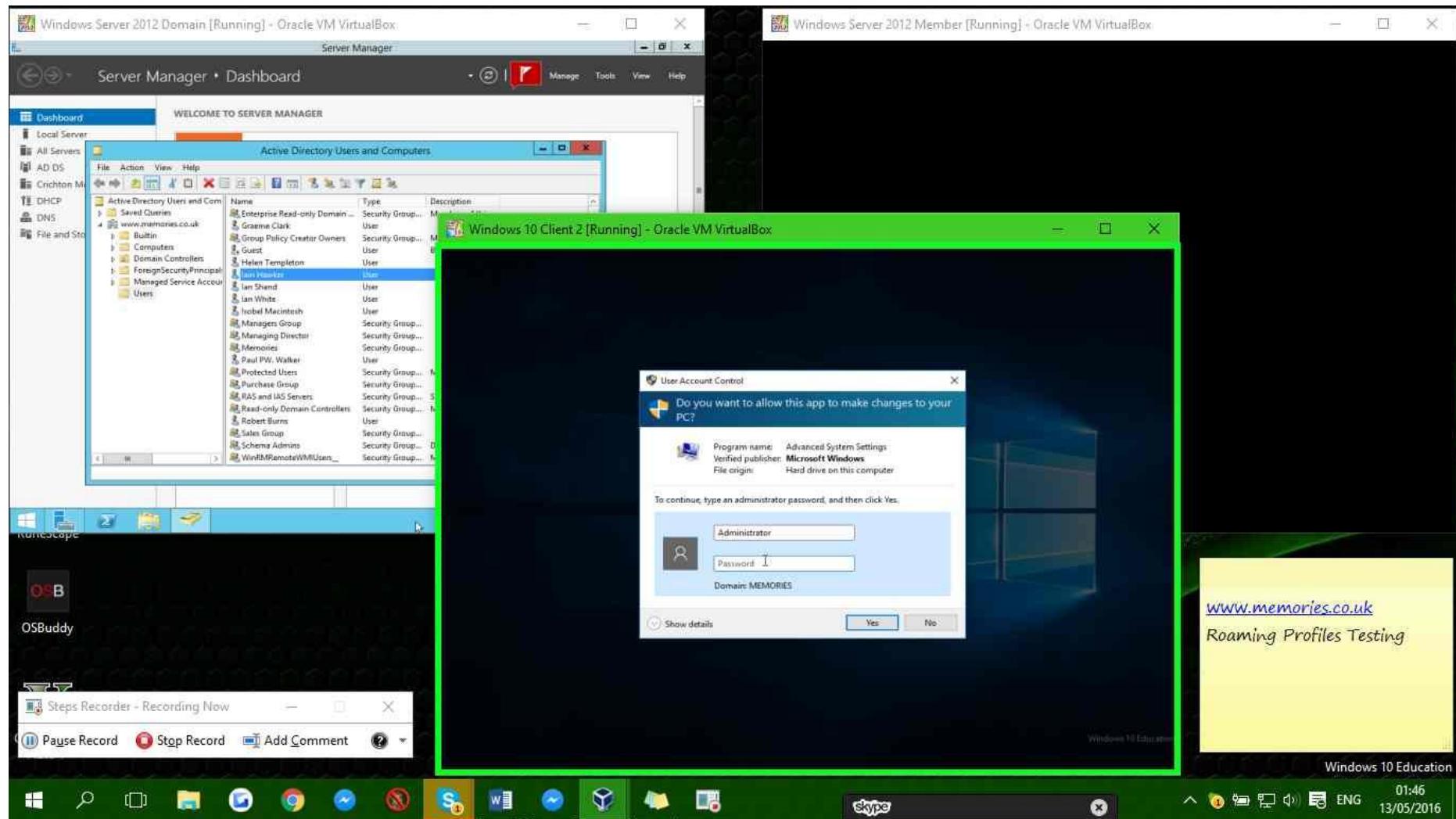
Previous Next

**Step 37: (13/05/2016 01:46:34)** User left click on "qt\_scrollarea\_viewport (pane)" in "Windows 10 Client 2 [Running] - Oracle VM VirtualBox"



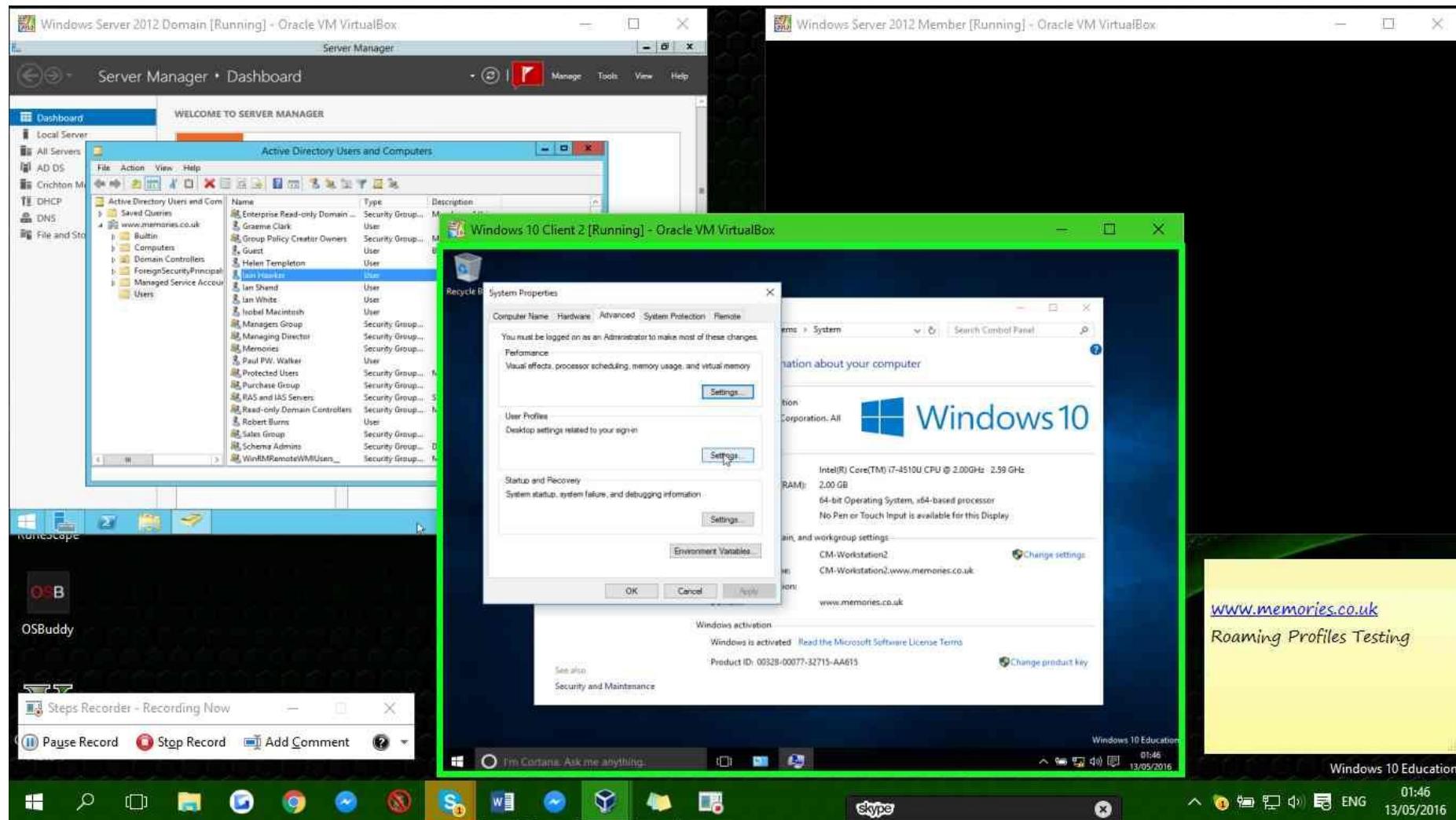
Previous Next

**Step 38: (13/05/2016 01:46:36)** User keyboard input on "Windows 10 Client 2 [Running] - Oracle VM VirtualBox (window)" in "Windows 10 Client 2 [Running] - Oracle VM VirtualBox" [CAPSLOCK CAPSLOCK CAPSLOCK CAPSLOCK ...]



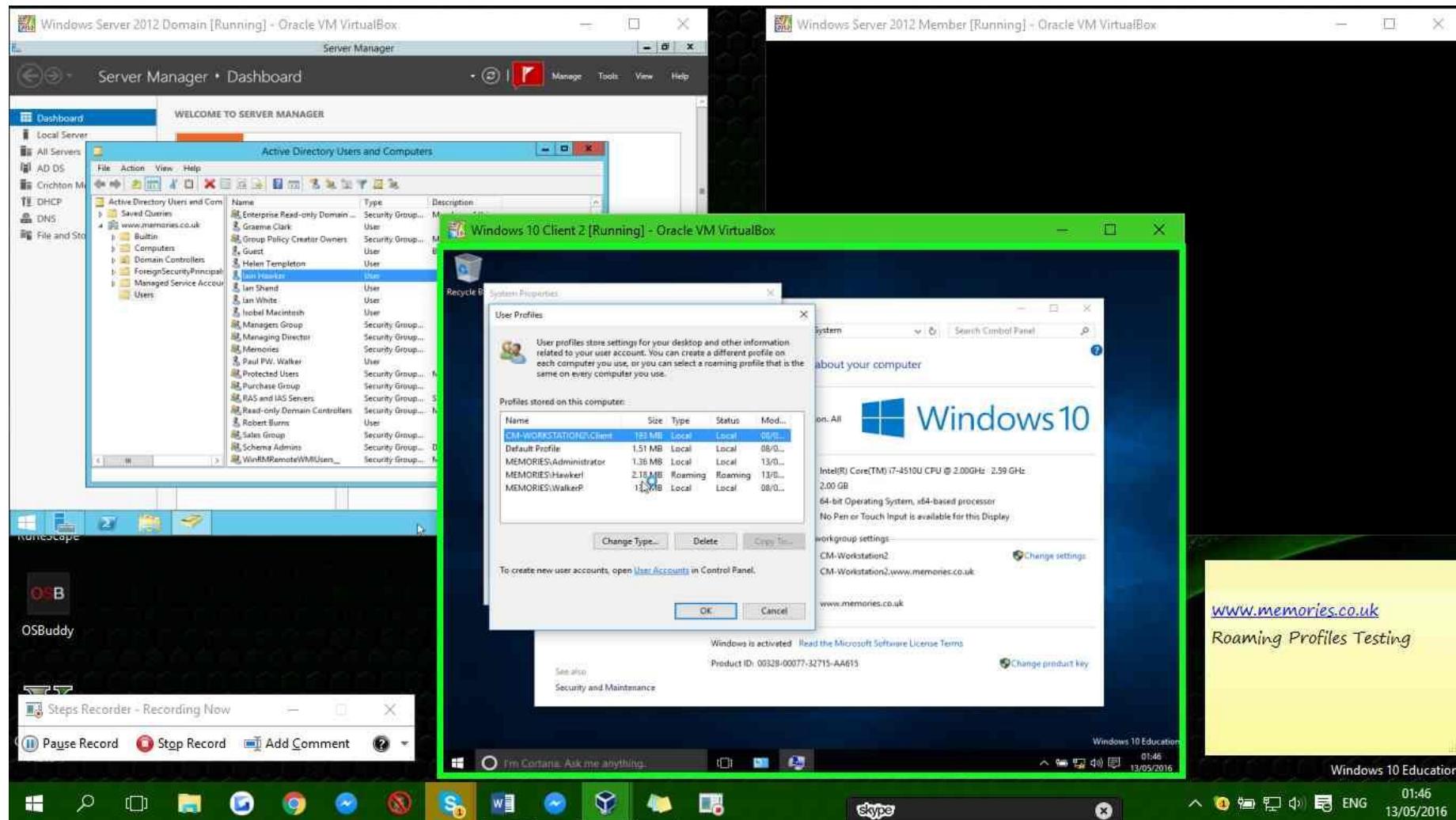
Previous Next

Step 39: (13/05/2016 01:46:45) User left click on "qt\_scrollarea\_viewport (pane)" in "Windows 10 Client 2 [Running] - Oracle VM VirtualBox"



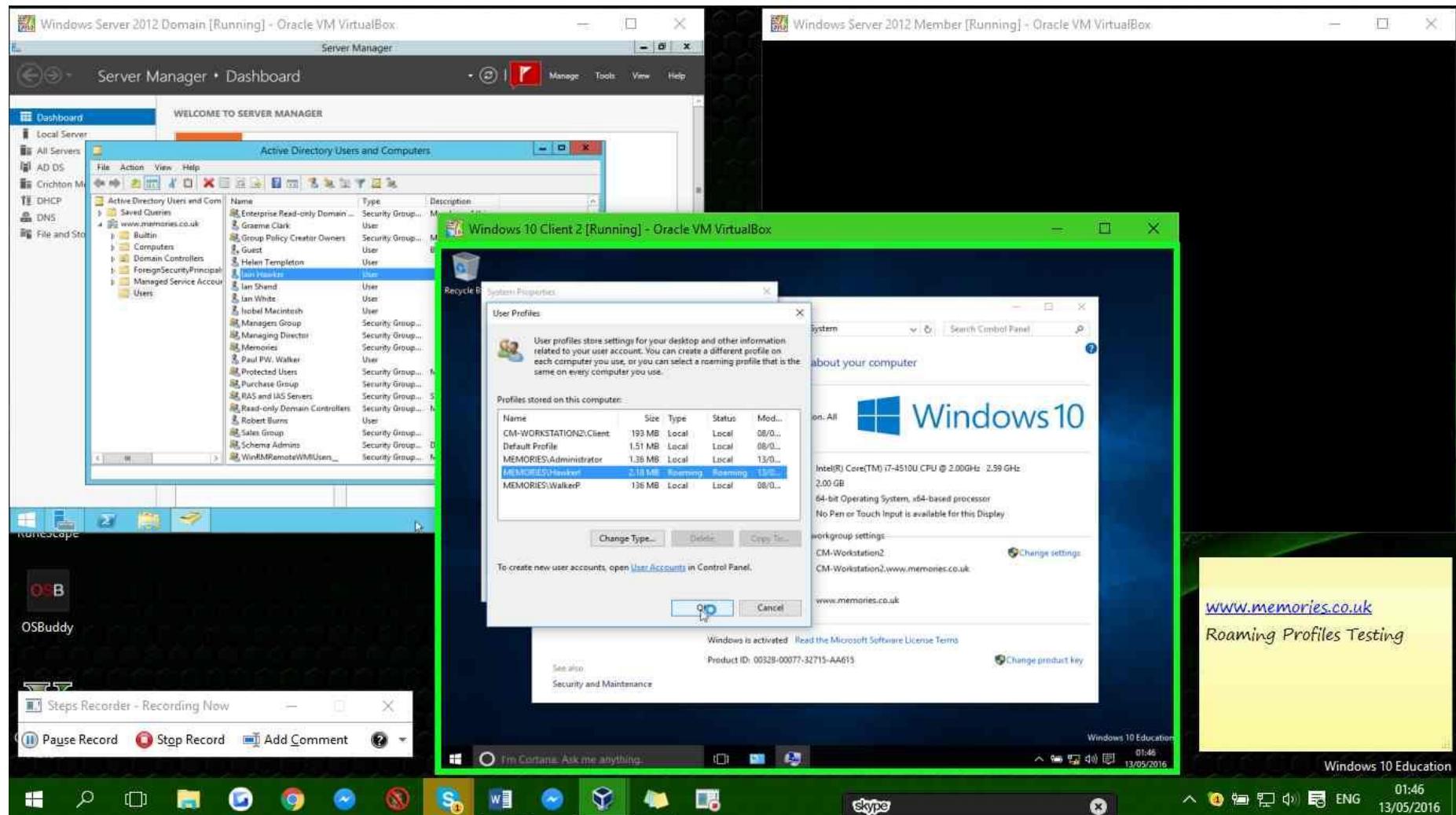
Previous Next

Step 40: (13/05/2016 01:46:52) User left click on "qt\_scrollarea\_viewport (pane)" in "Windows 10 Client 2 [Running] - Oracle VM VirtualBox"



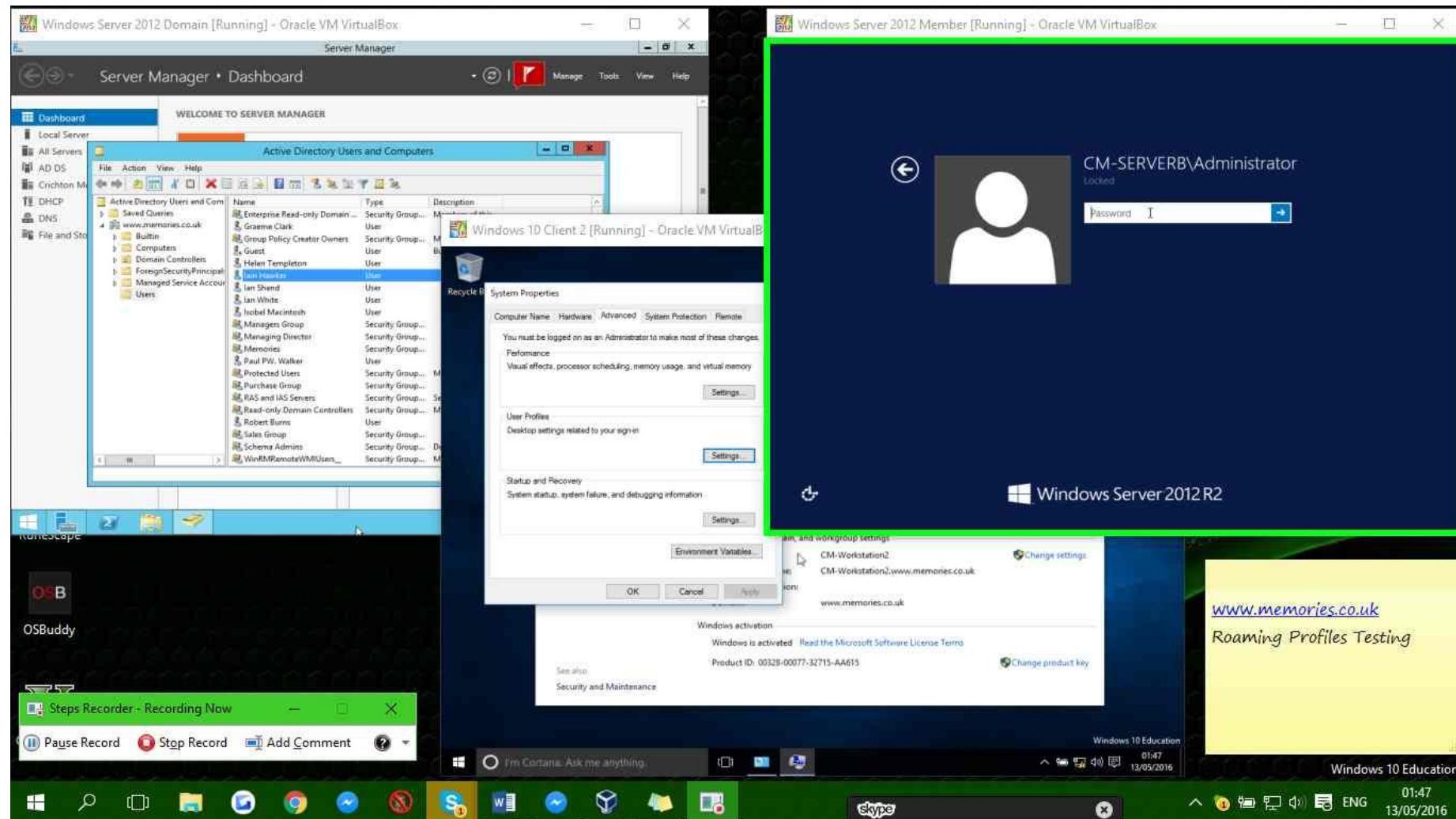
Previous Next

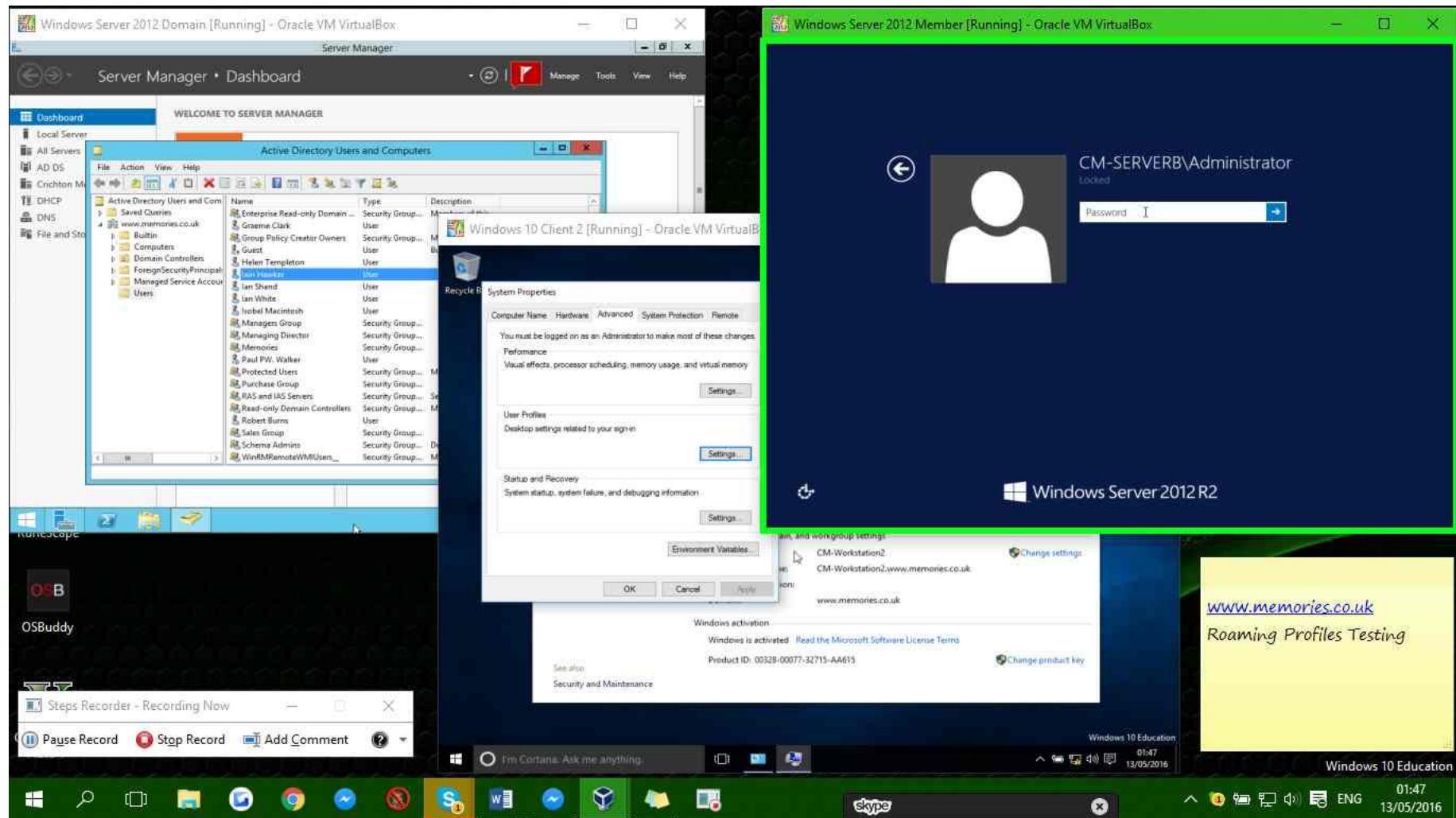
Step 41: (13/05/2016 01:46:56) User left click on "qt\_scrollarea\_viewport (pane)" in "Windows 10 Client 2 [Running] - Oracle VM VirtualBox"

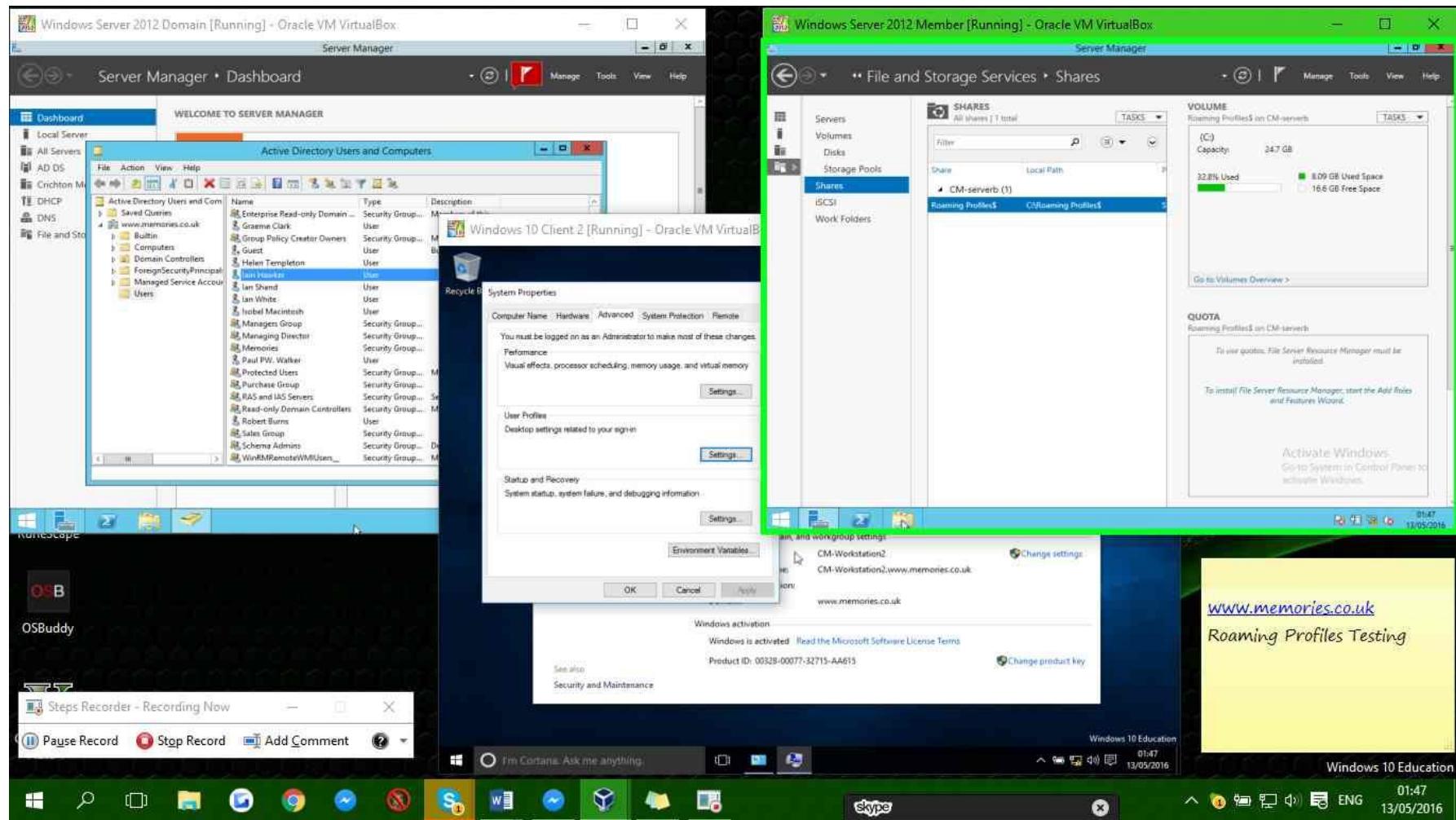


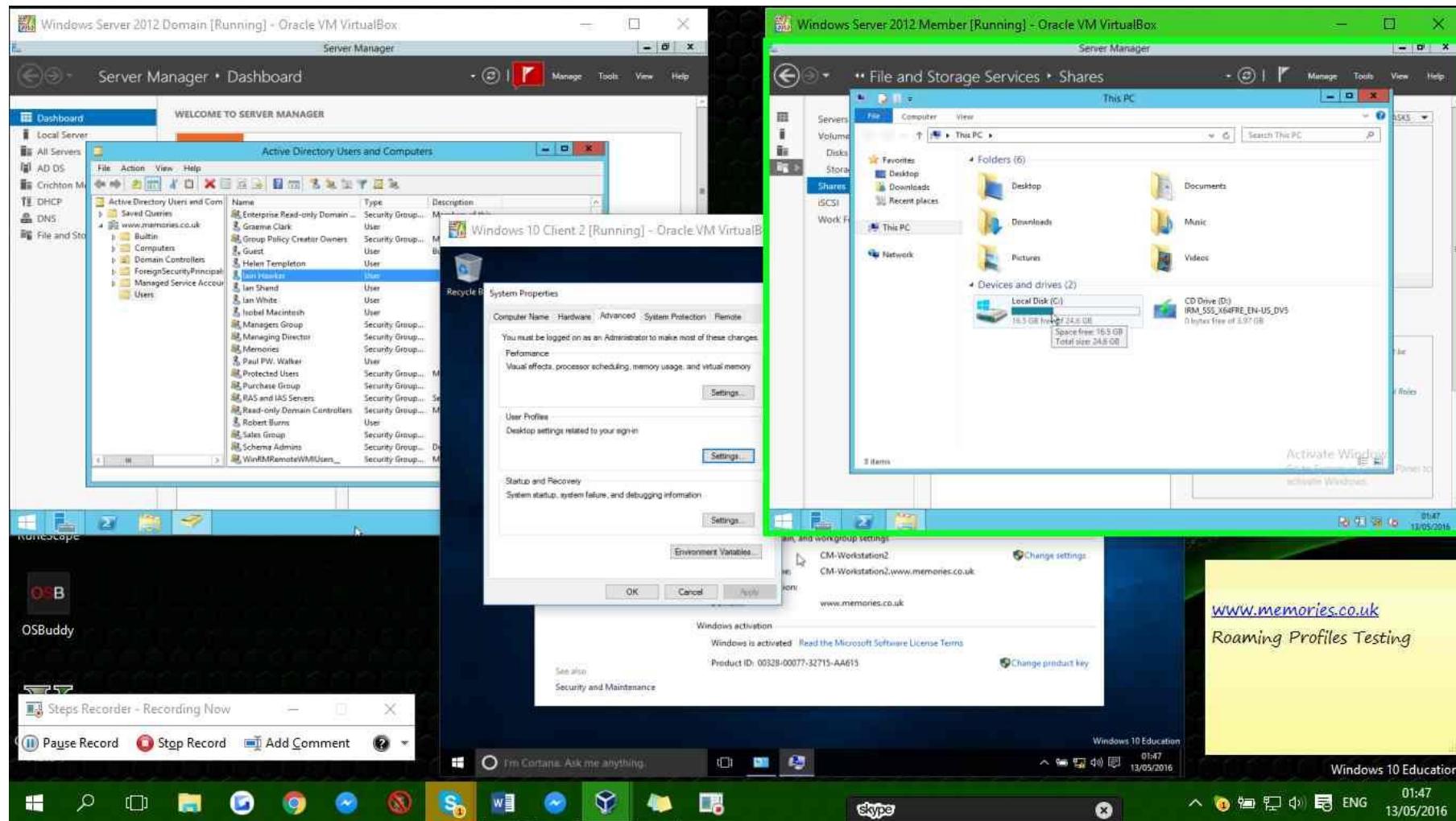
Previous Next

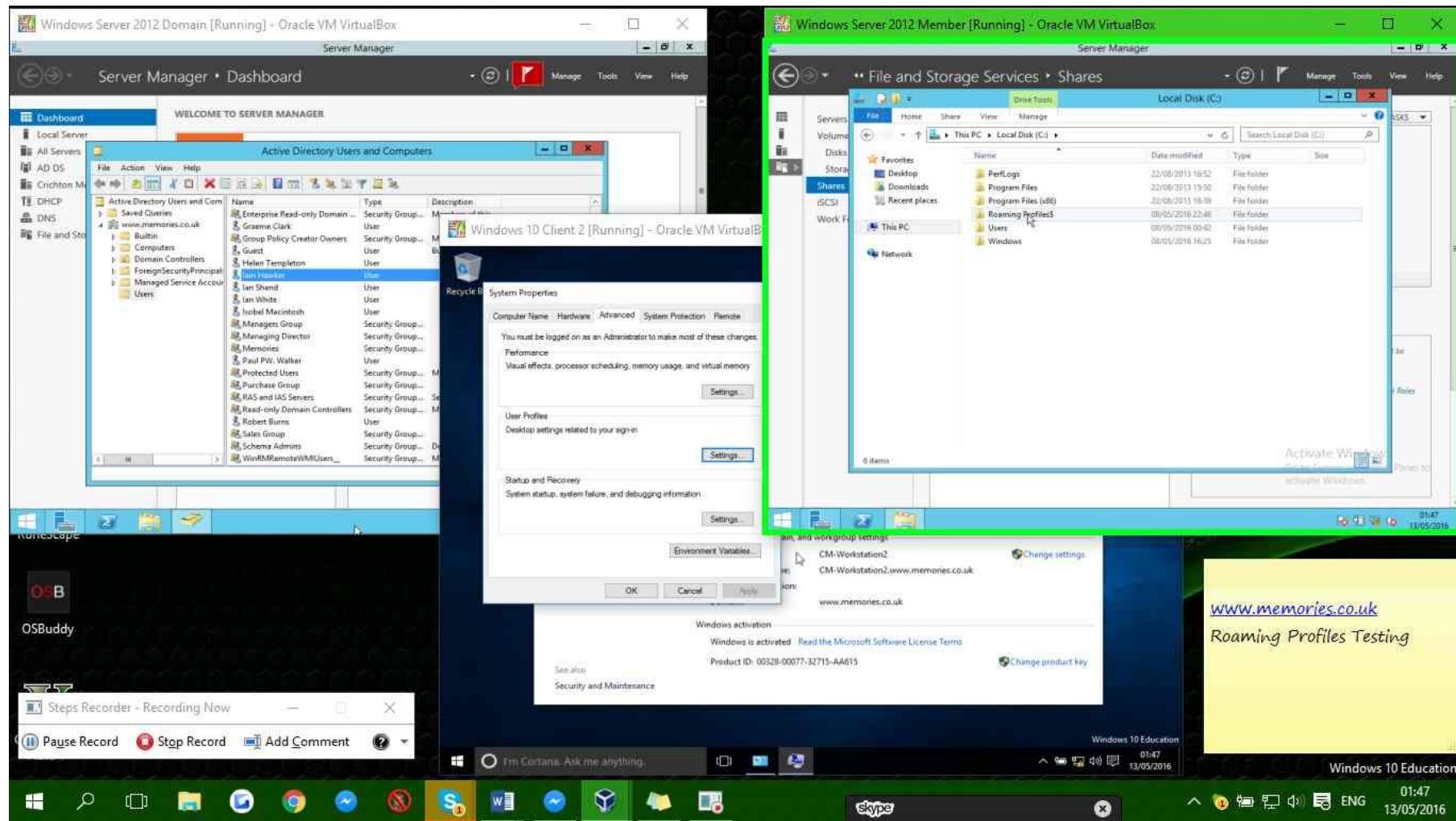
**Step 42: (13/05/2016 01:47:18)** User left click on "qt\_scrollarea\_viewport (pane)" in "Windows Server 2012 Member [Running] - Oracle VM VirtualBox"





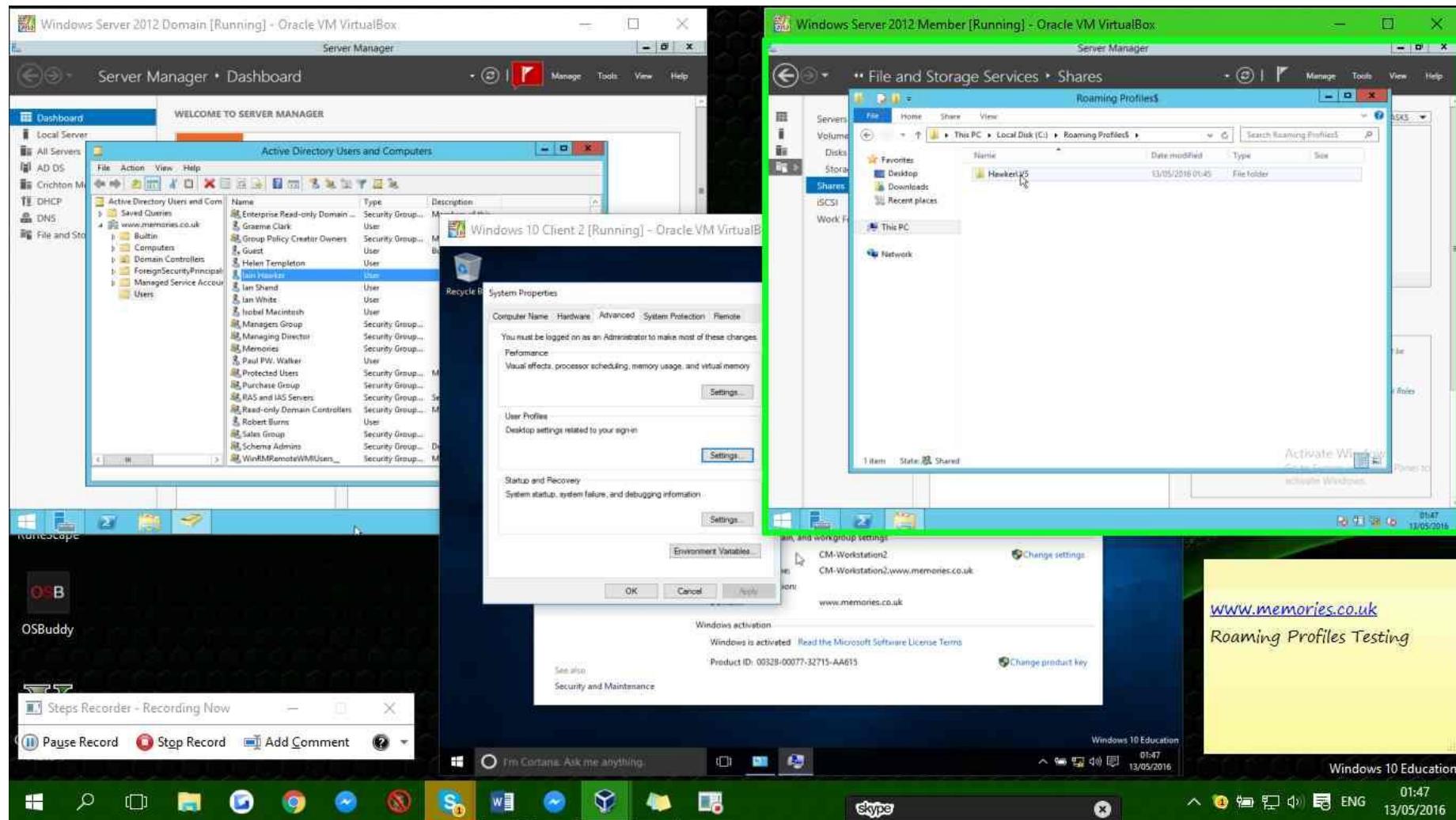


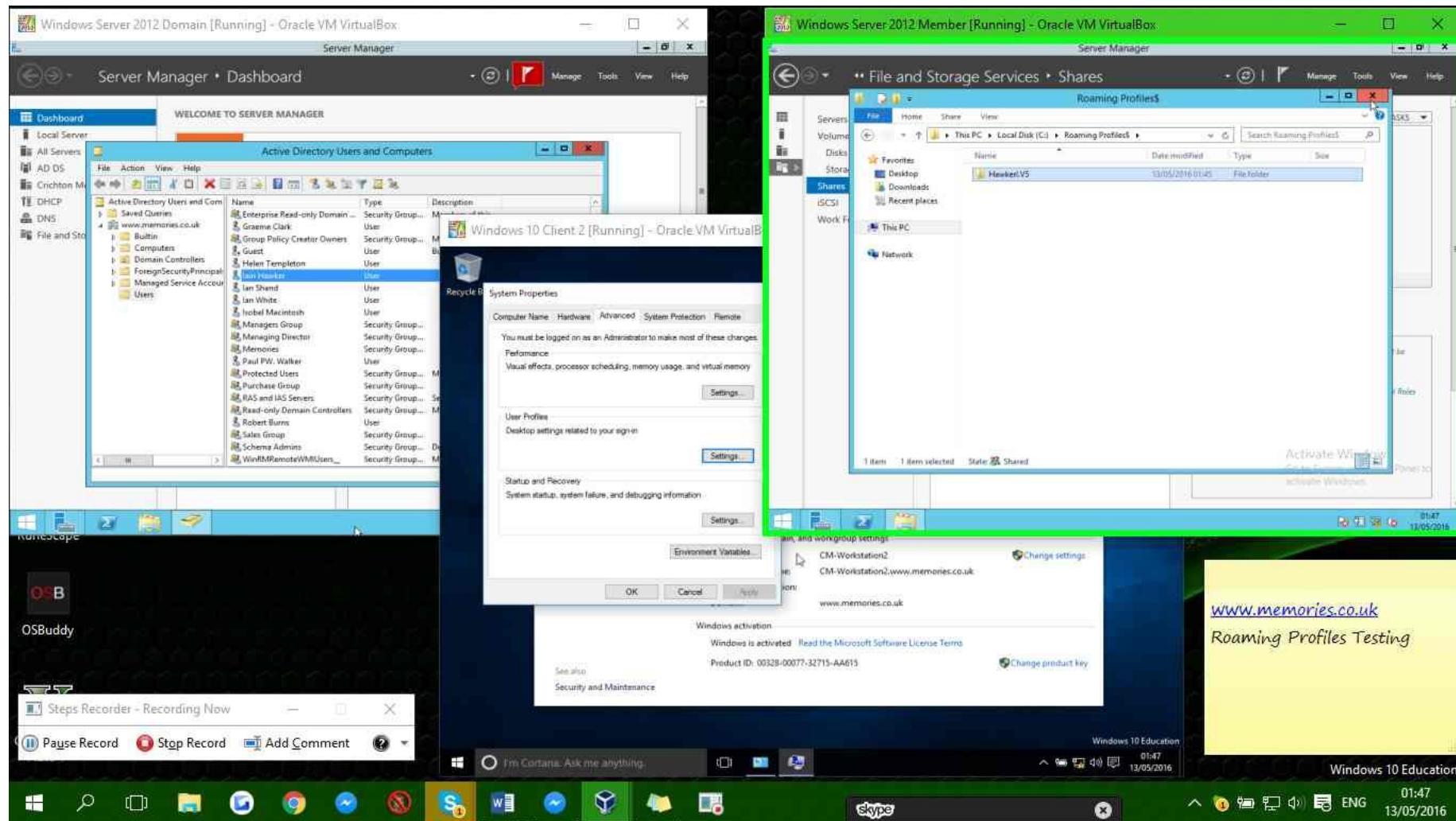


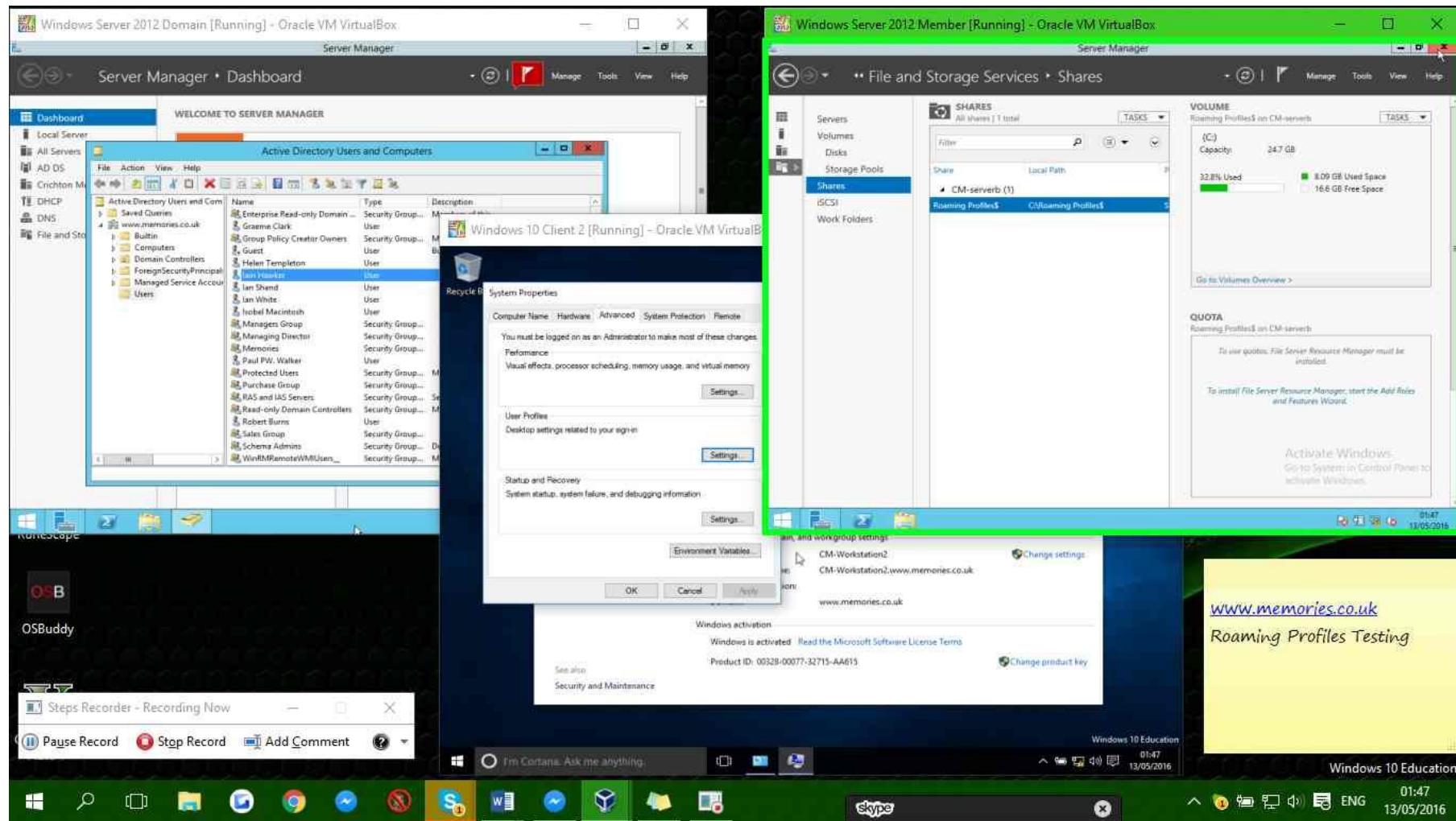


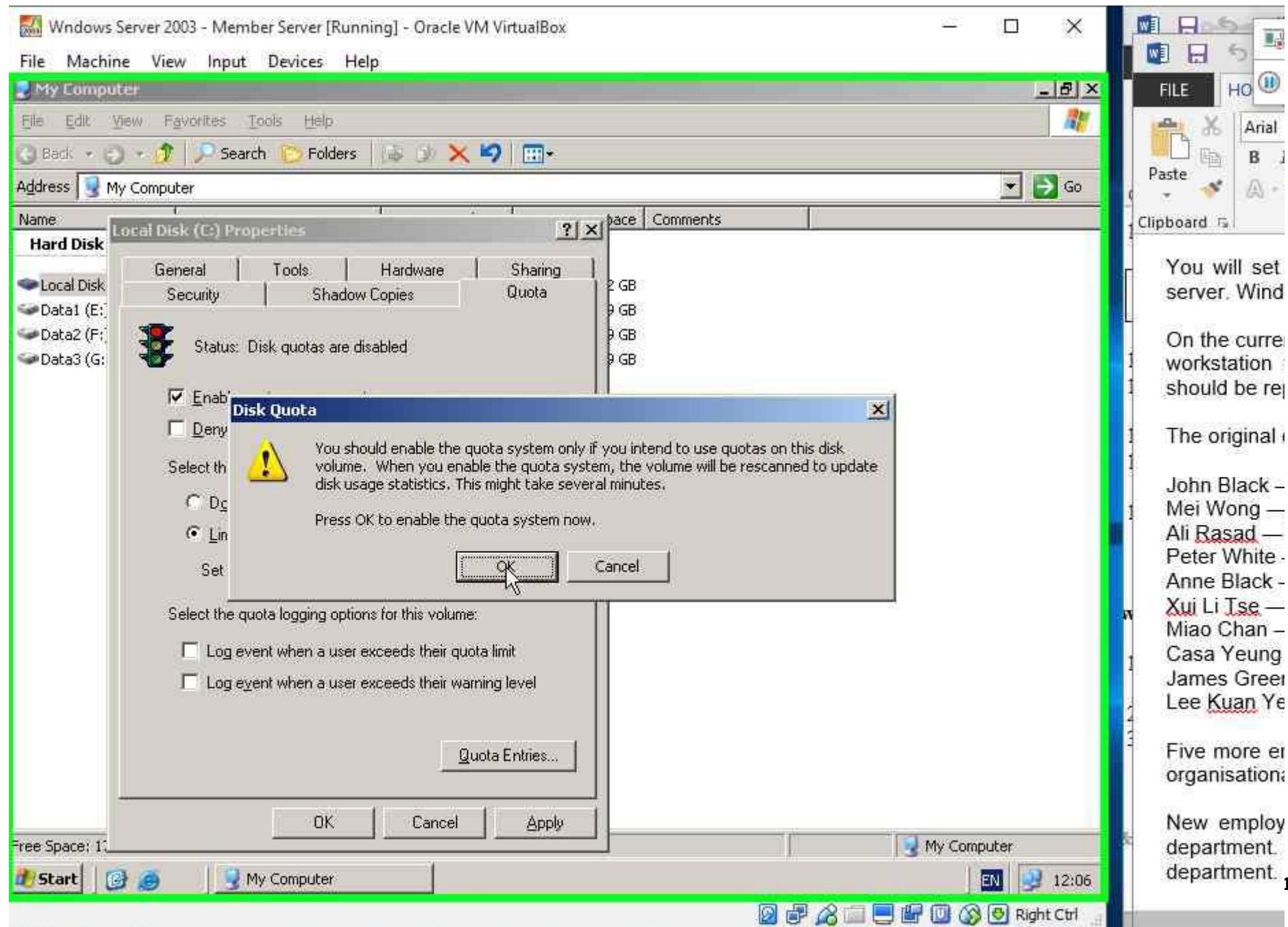
Previous Next

**Step 47: (13/05/2016 01:47:44)** User left click on "qt\_scrollarea\_viewport (pane)" in "Windows Server 2012 Member [Running] - Oracle VM VirtualBox"

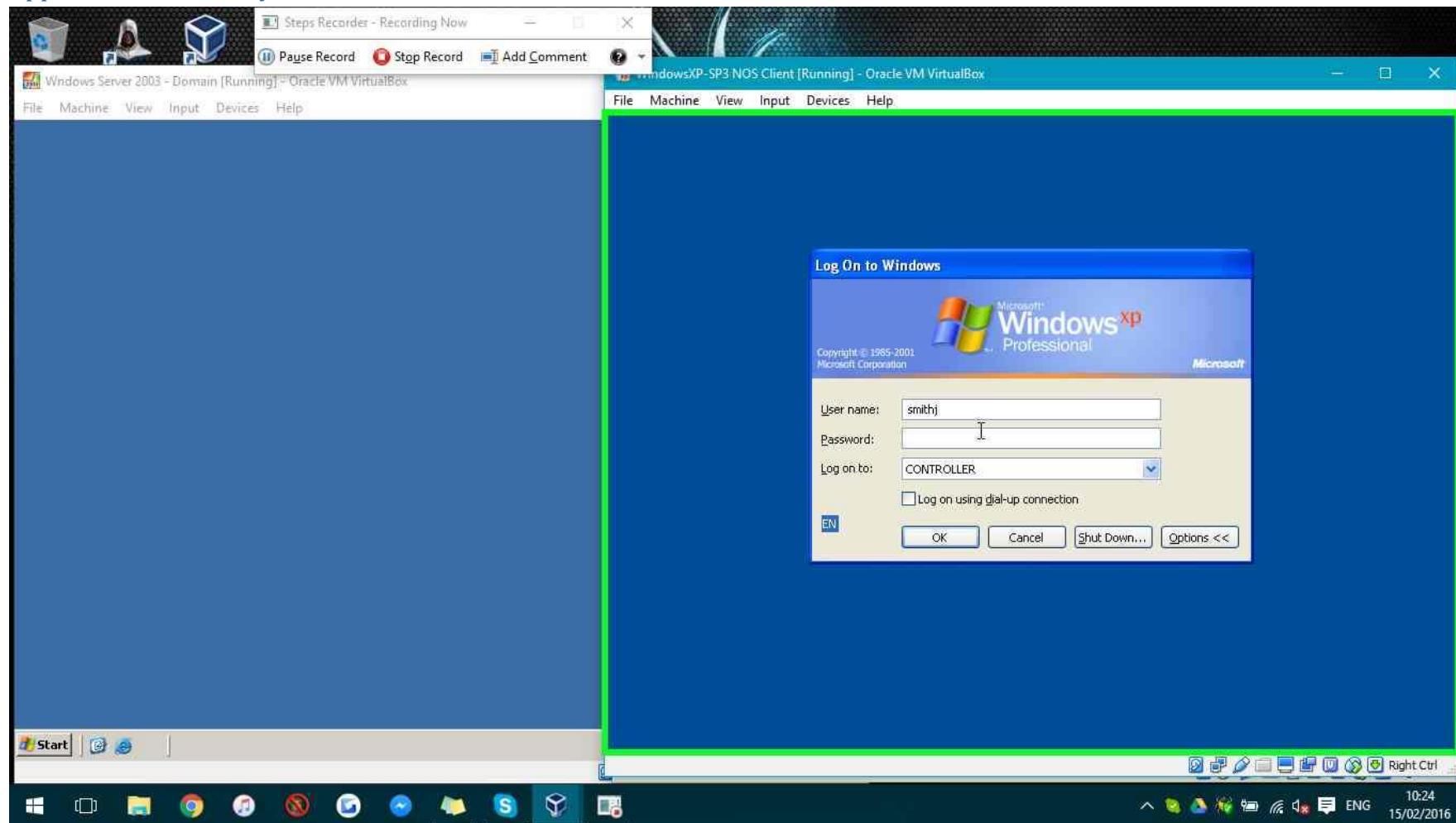


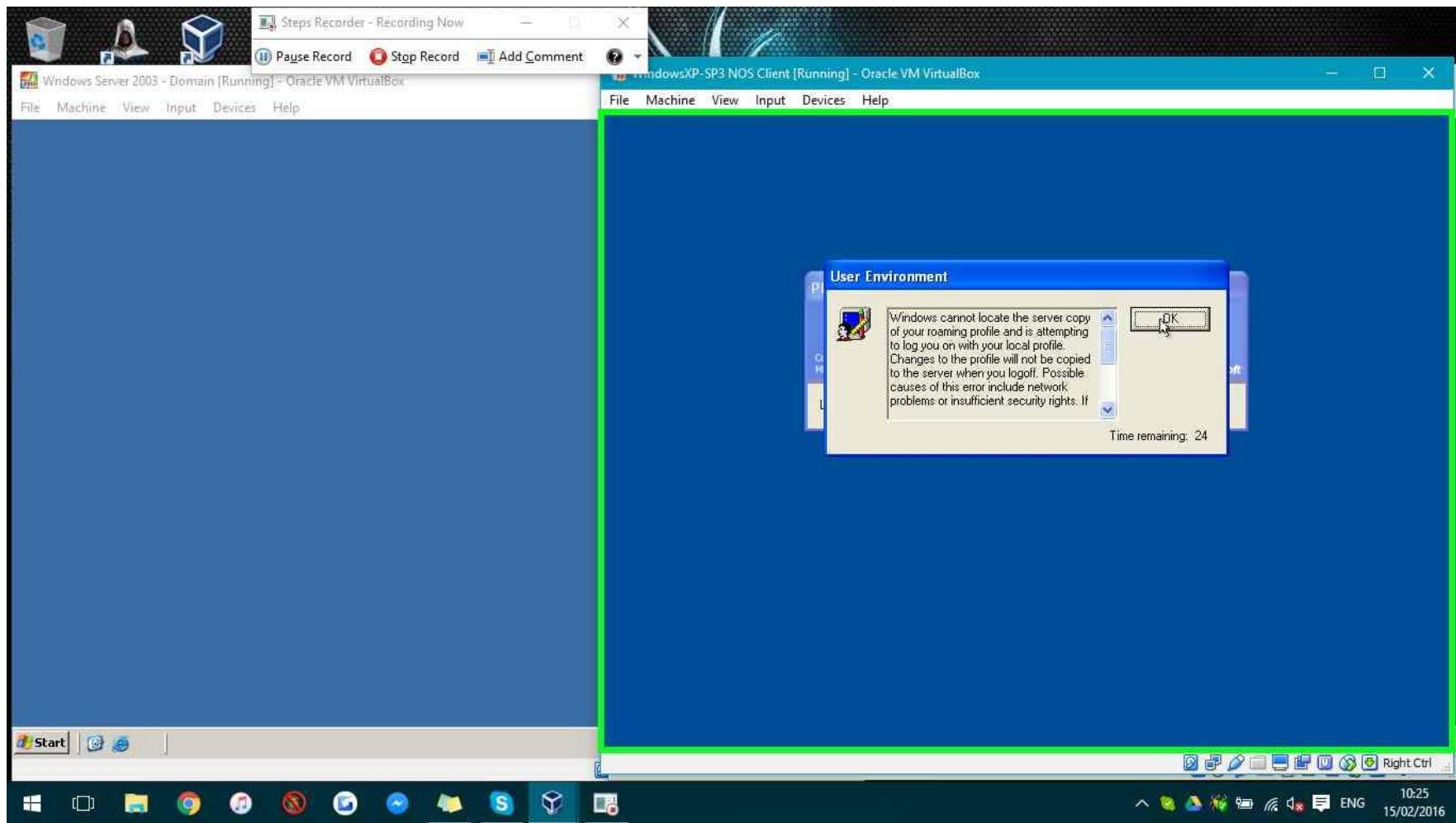


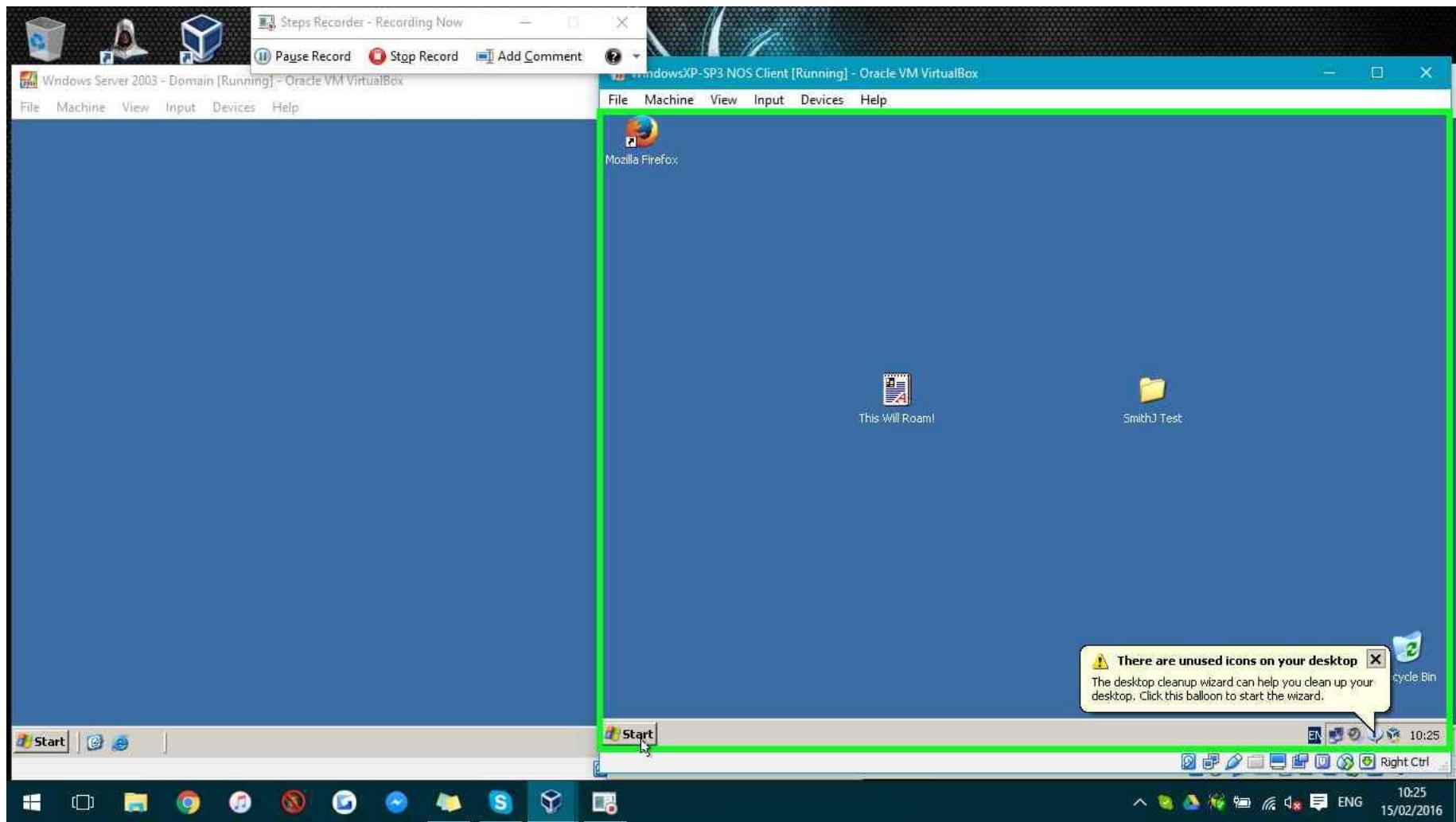


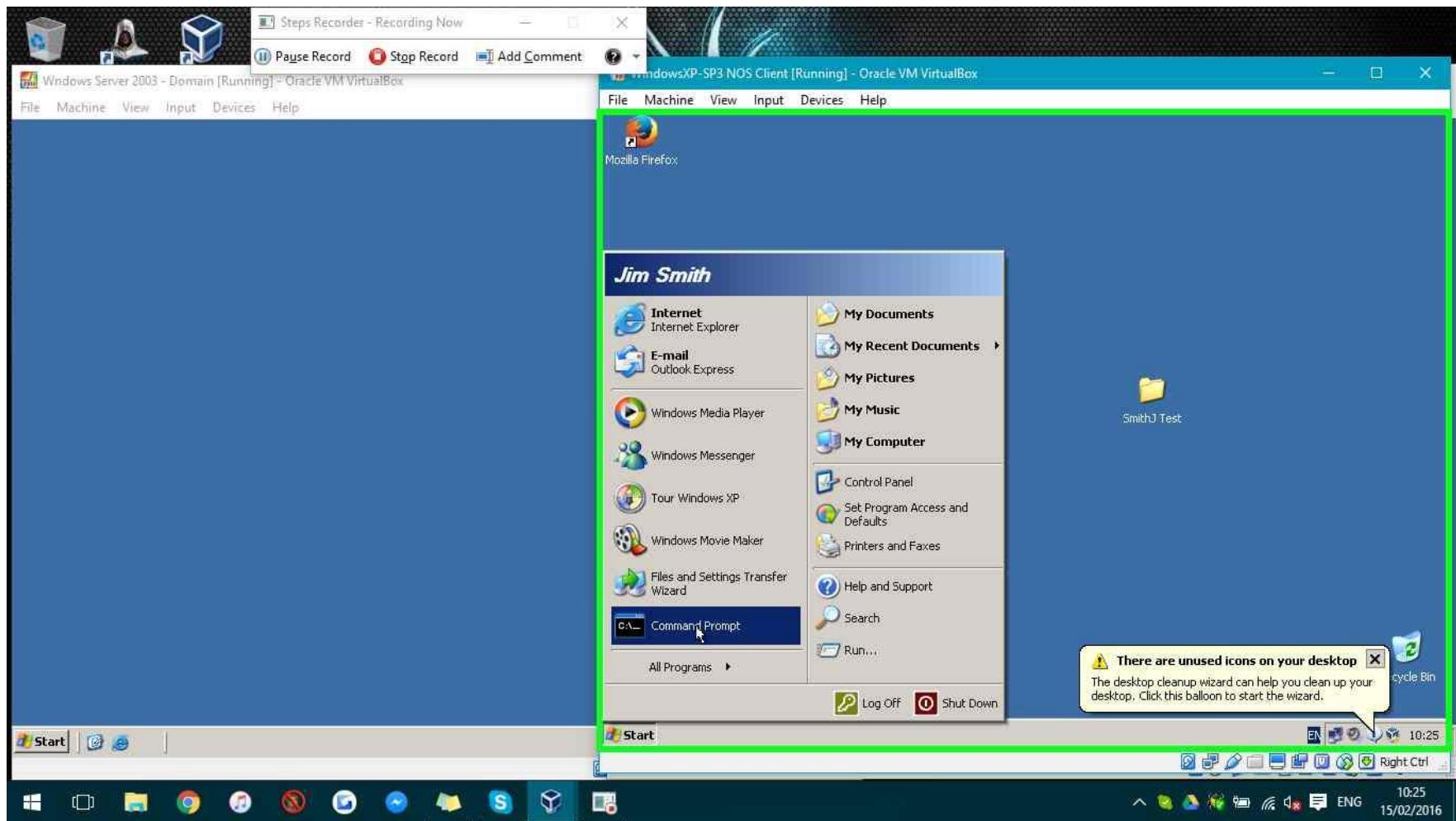


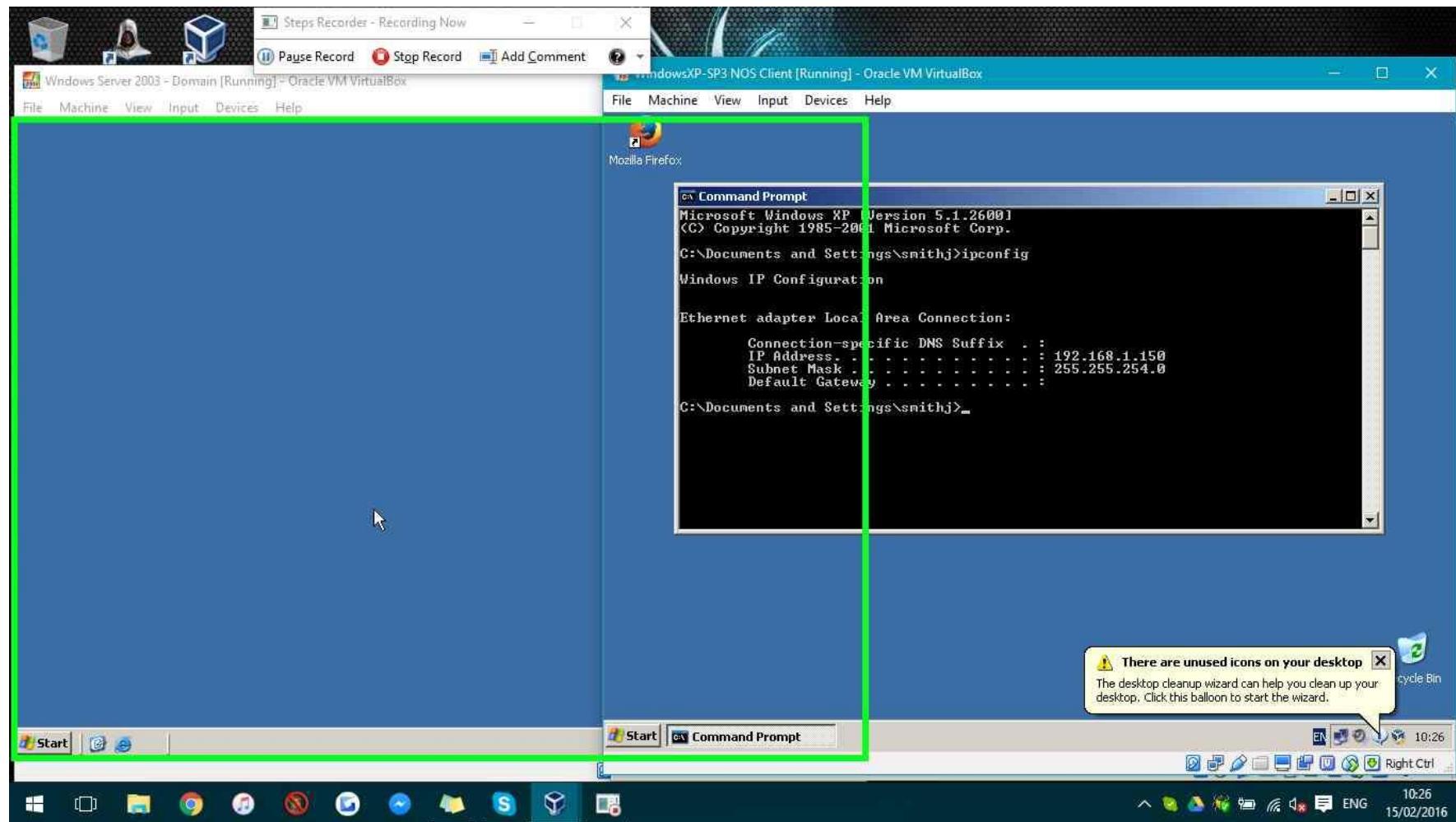
## Appendix 137: Security - Authentication PSR

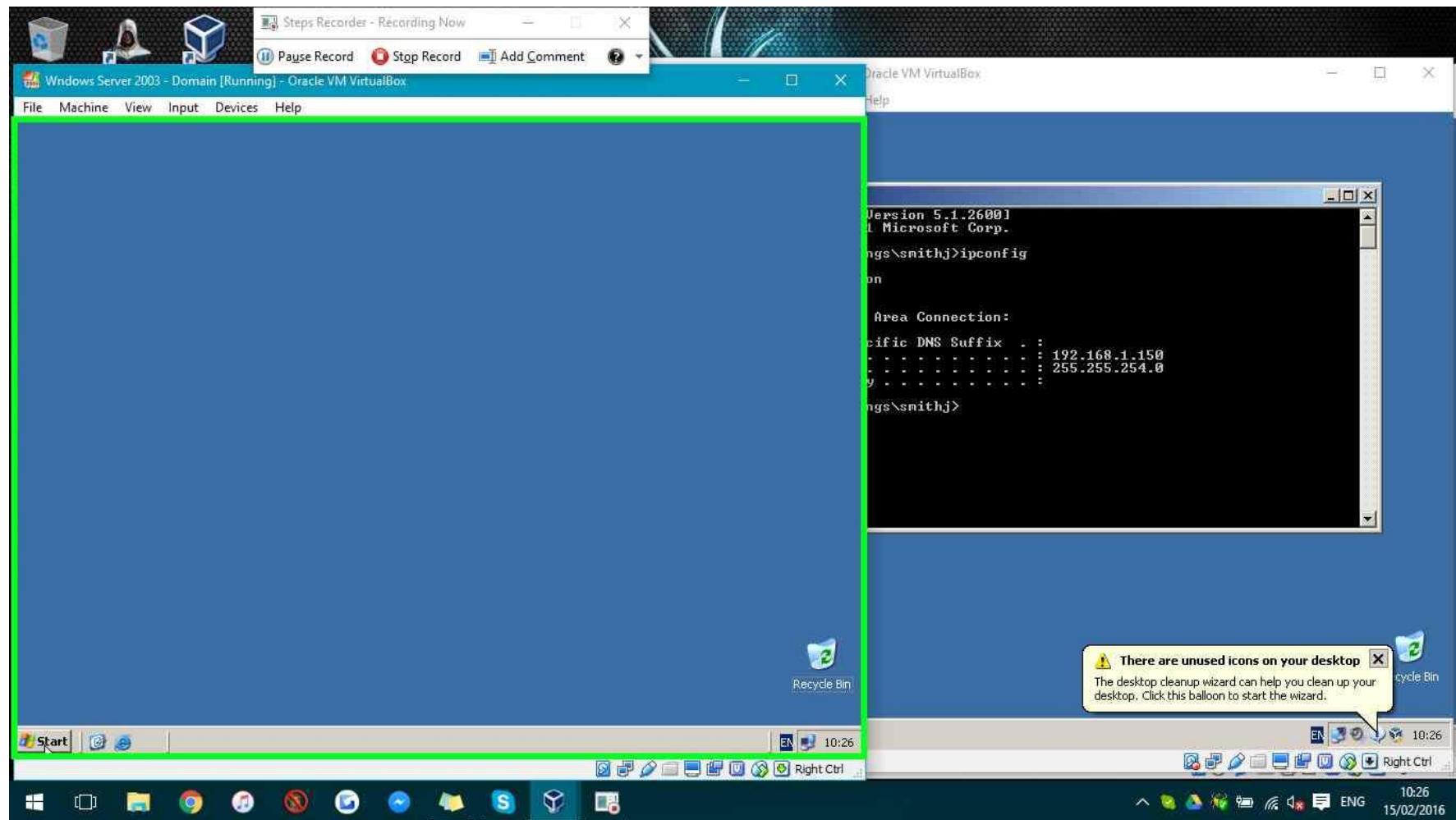


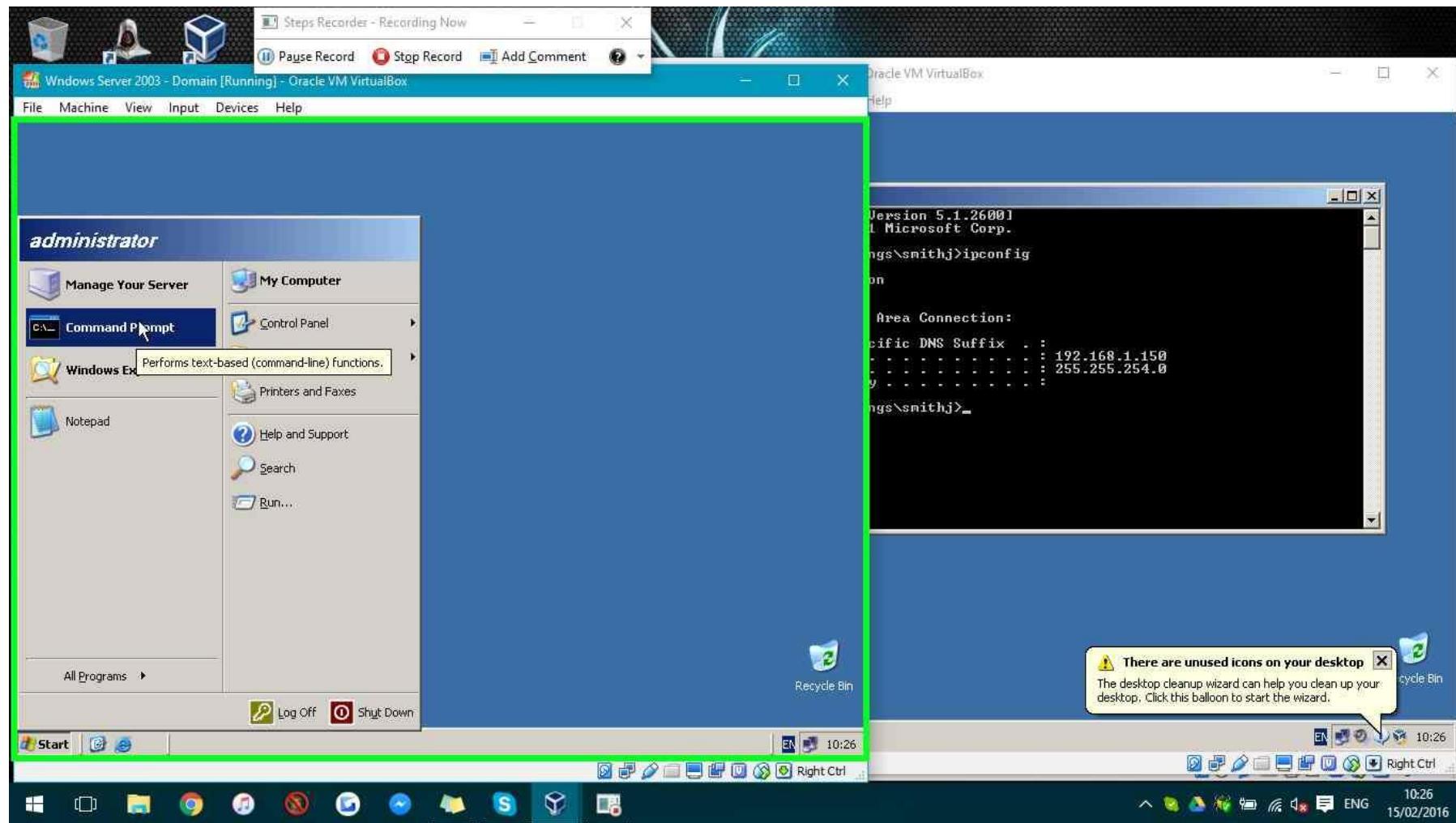


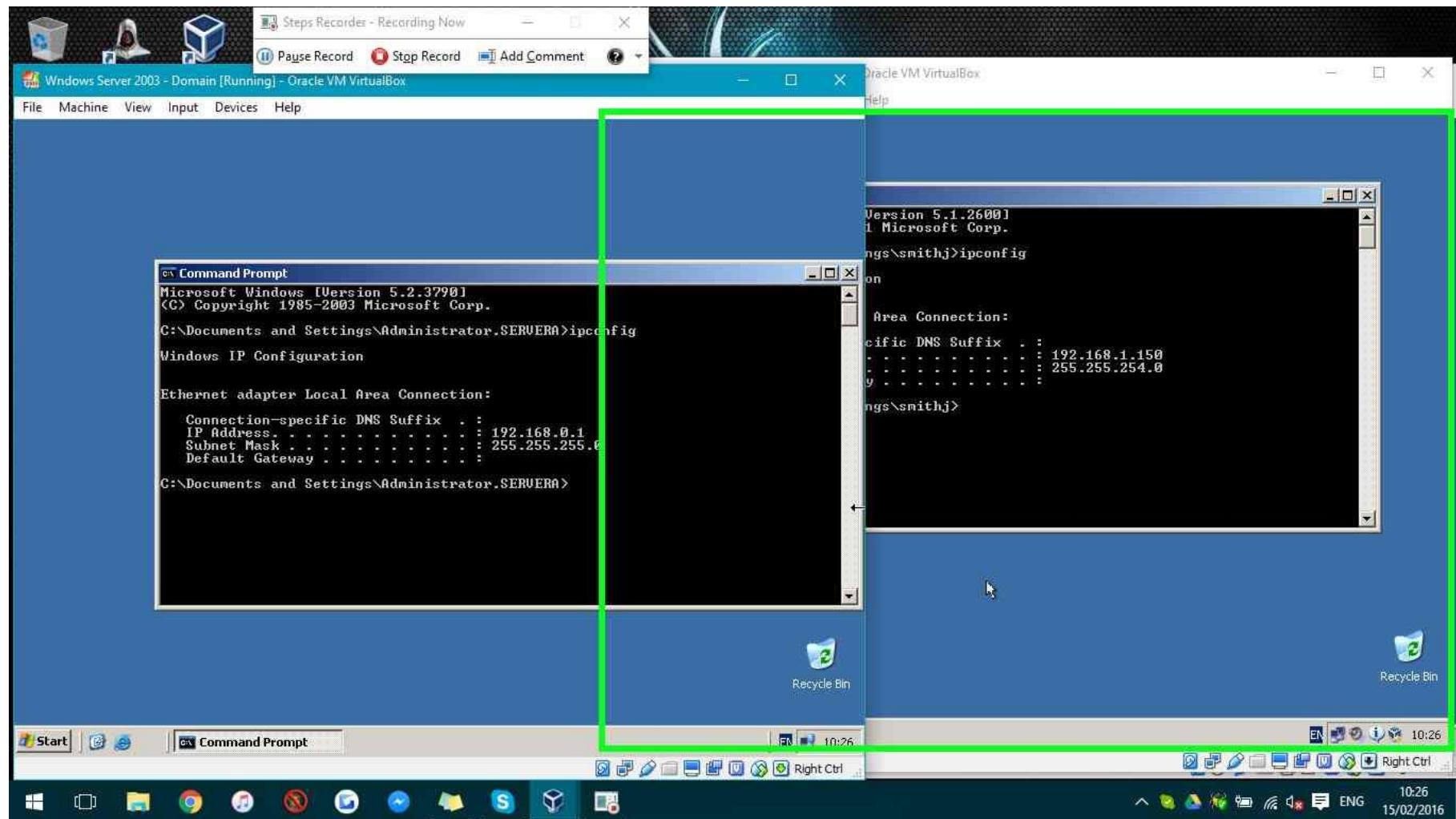


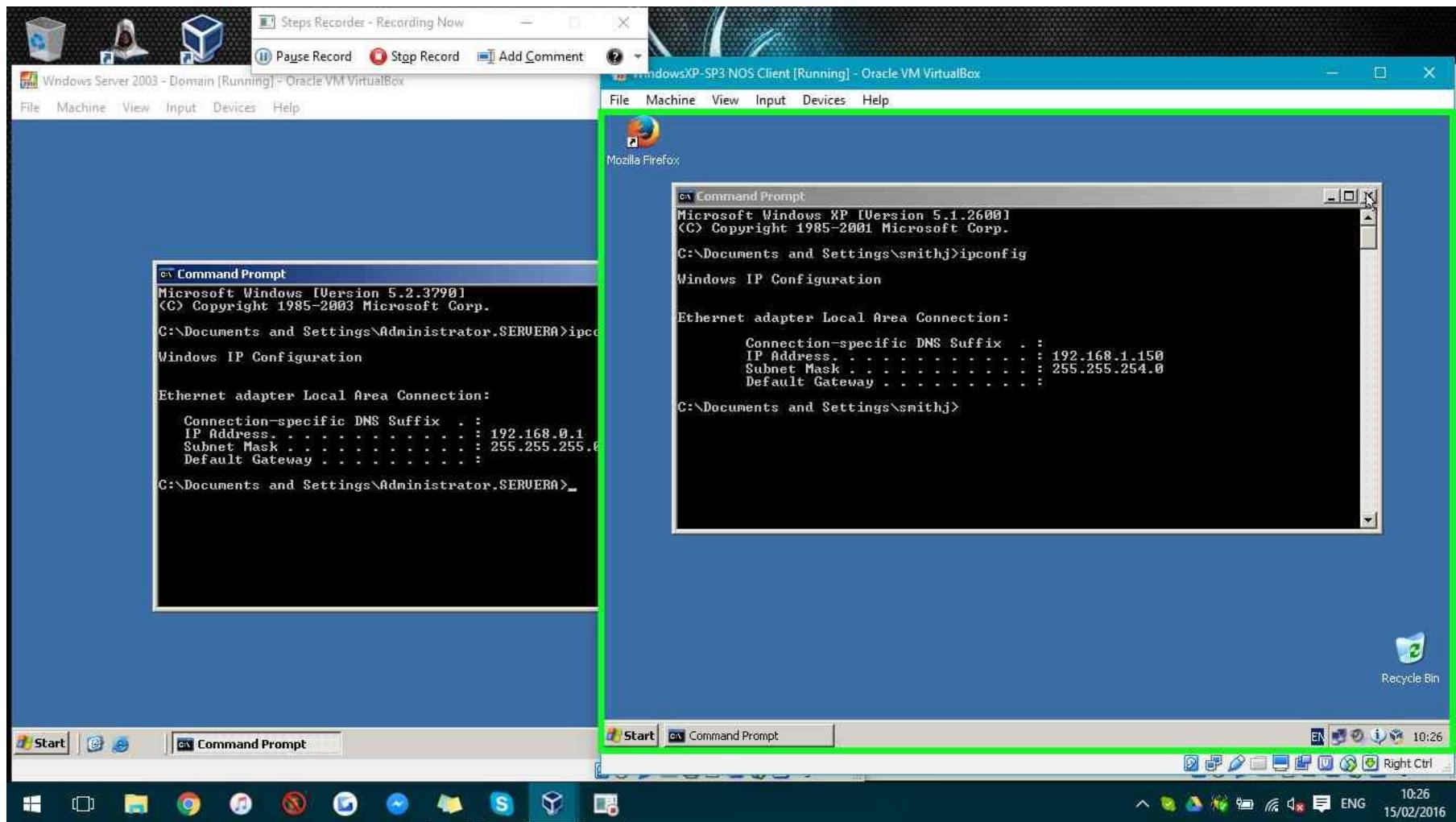


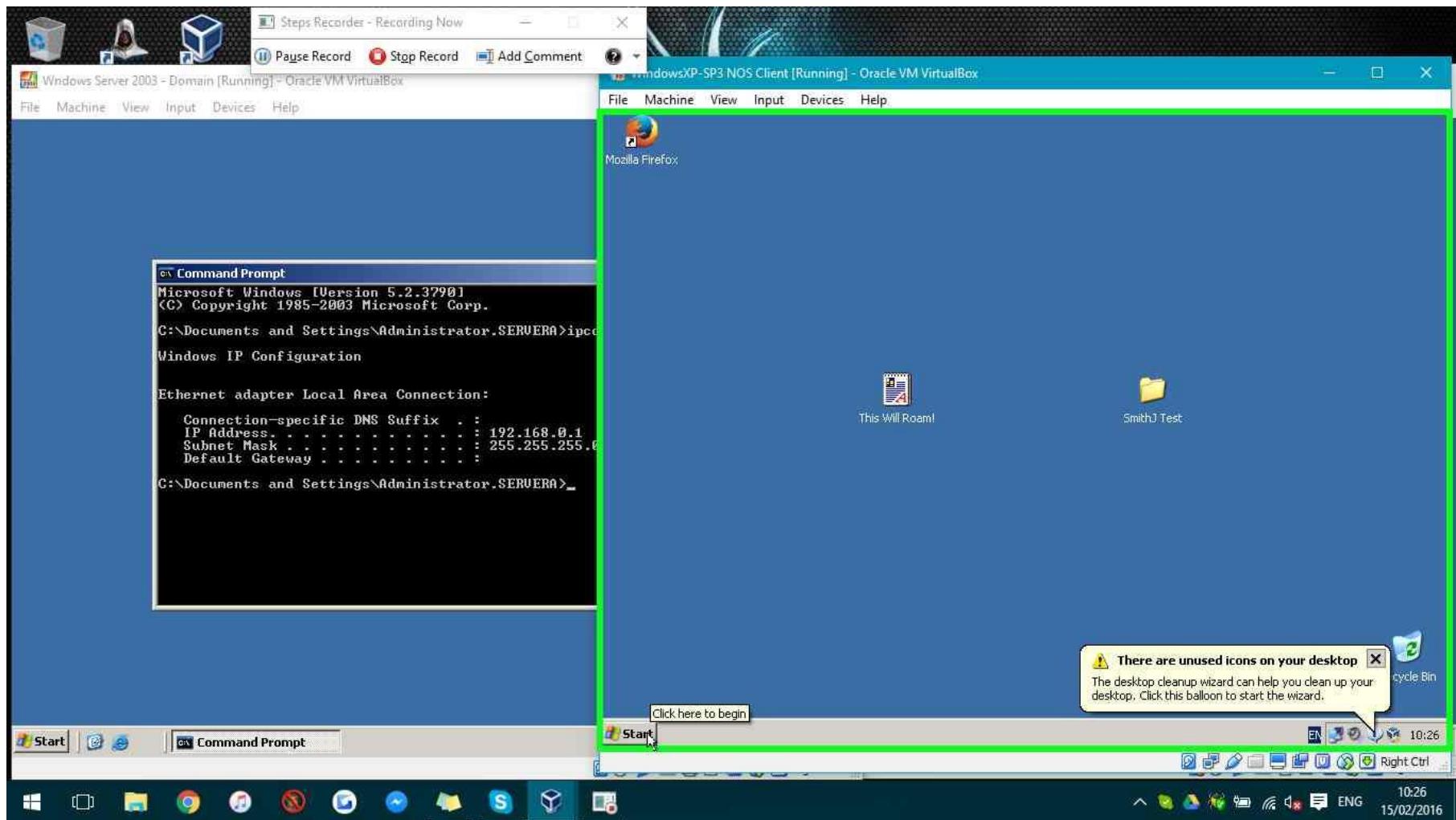


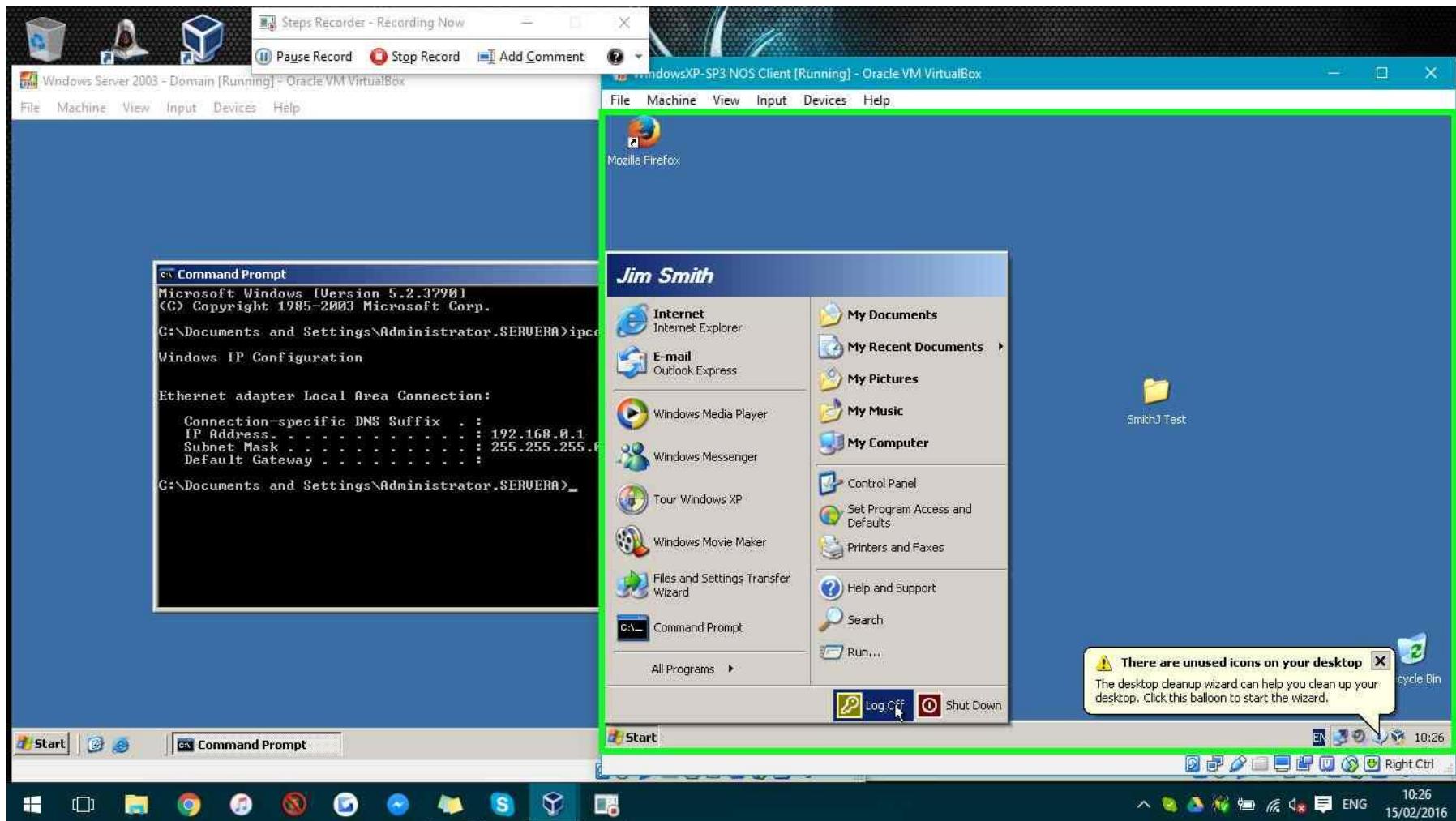


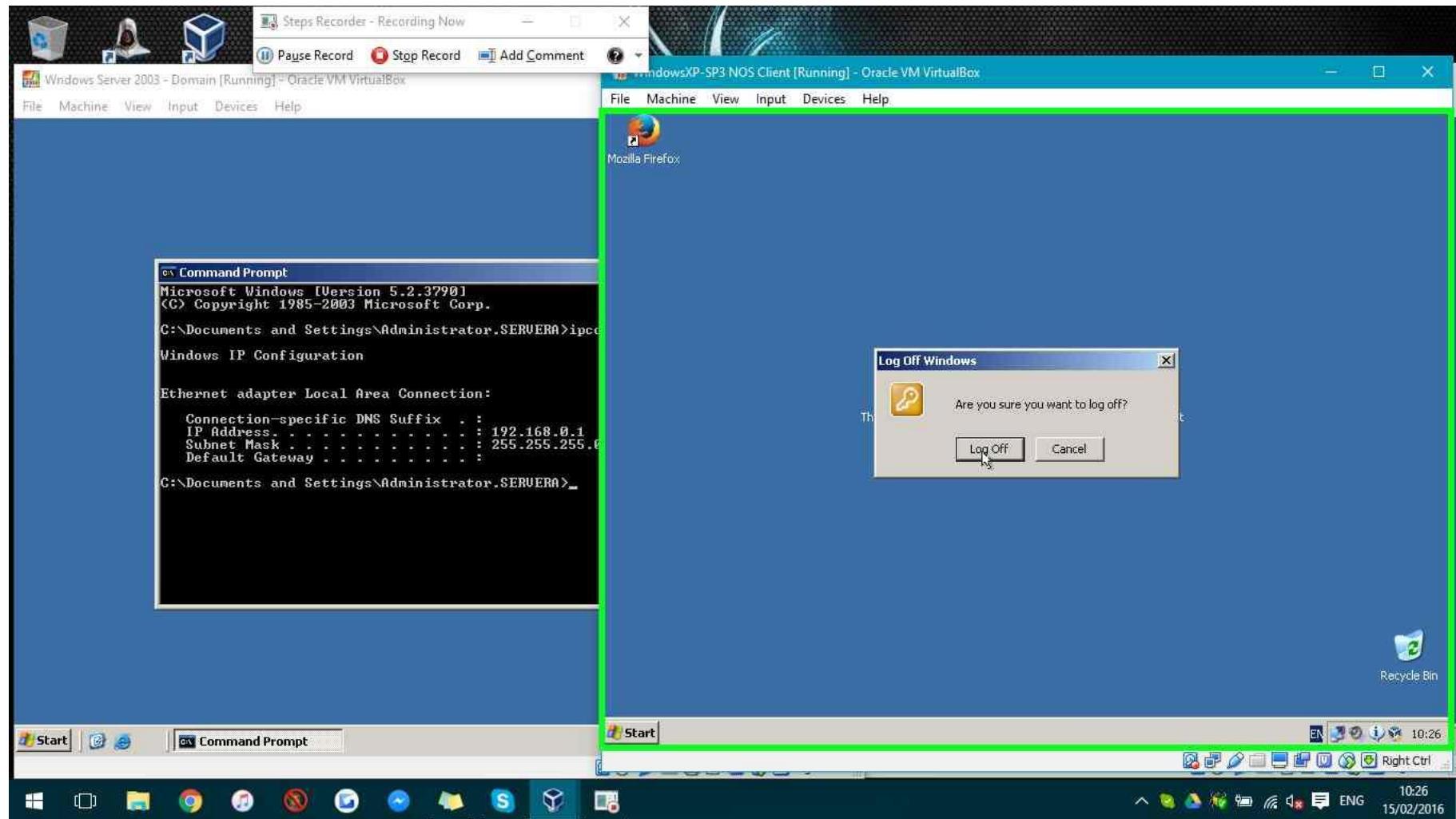


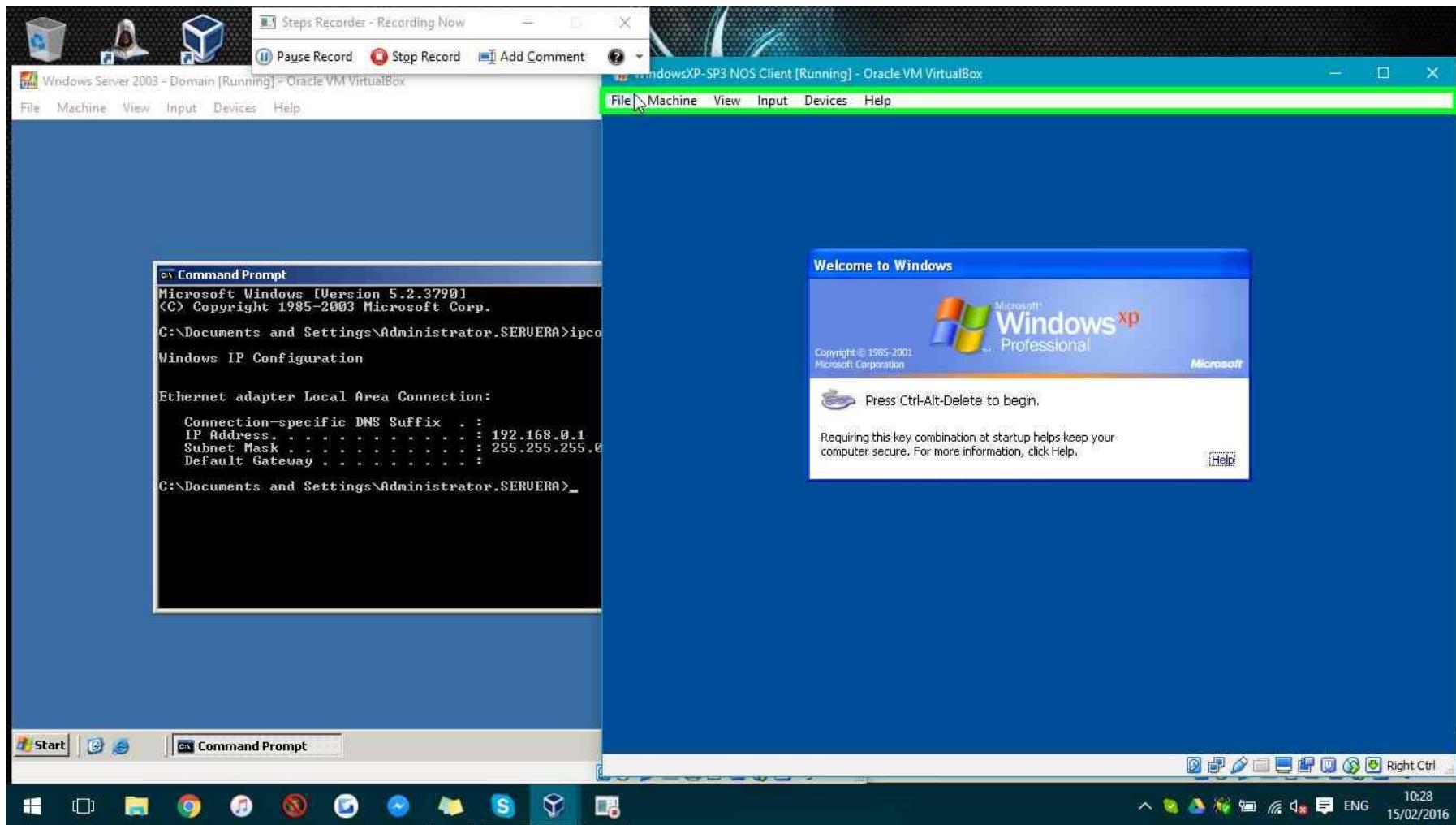


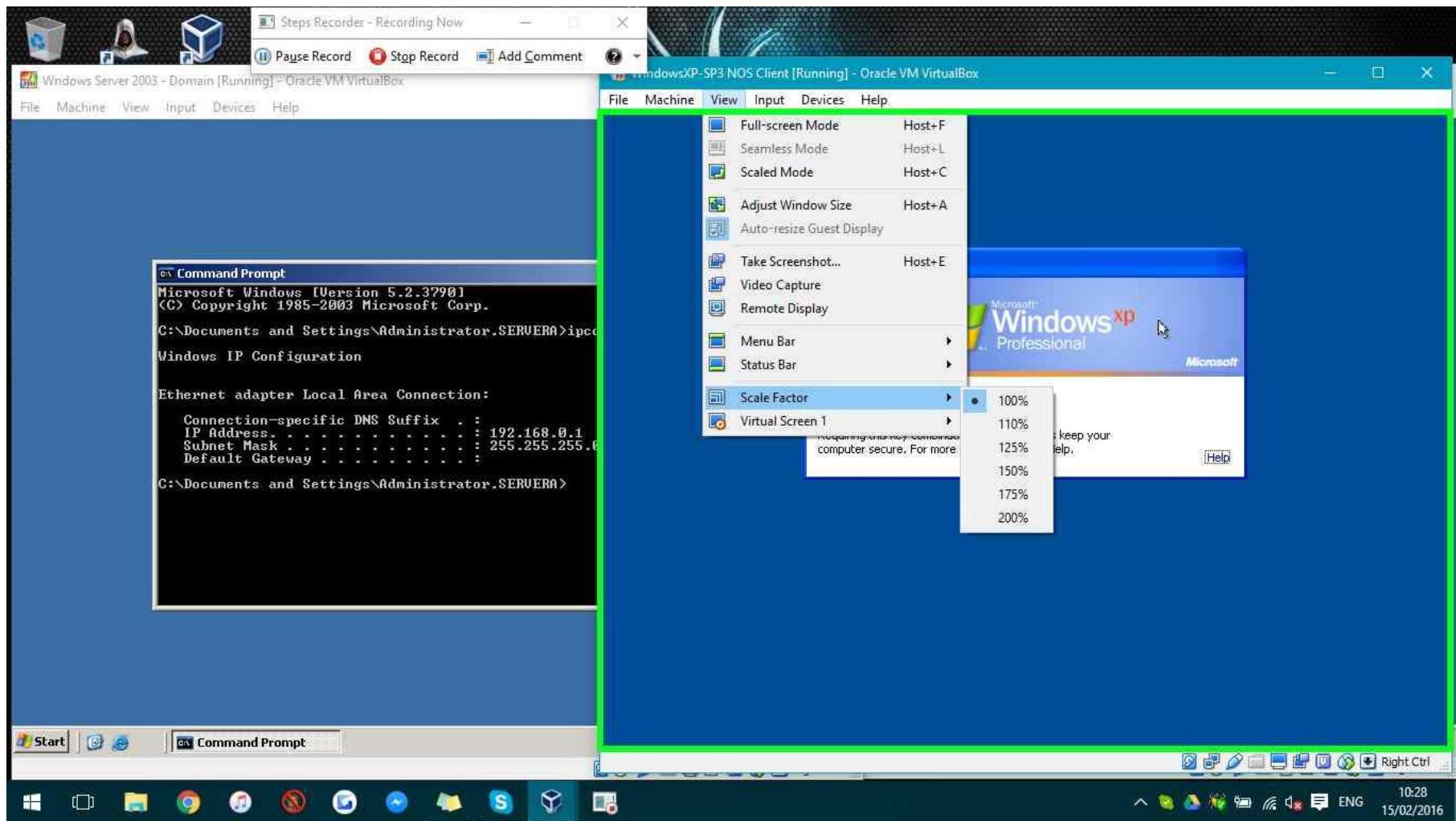


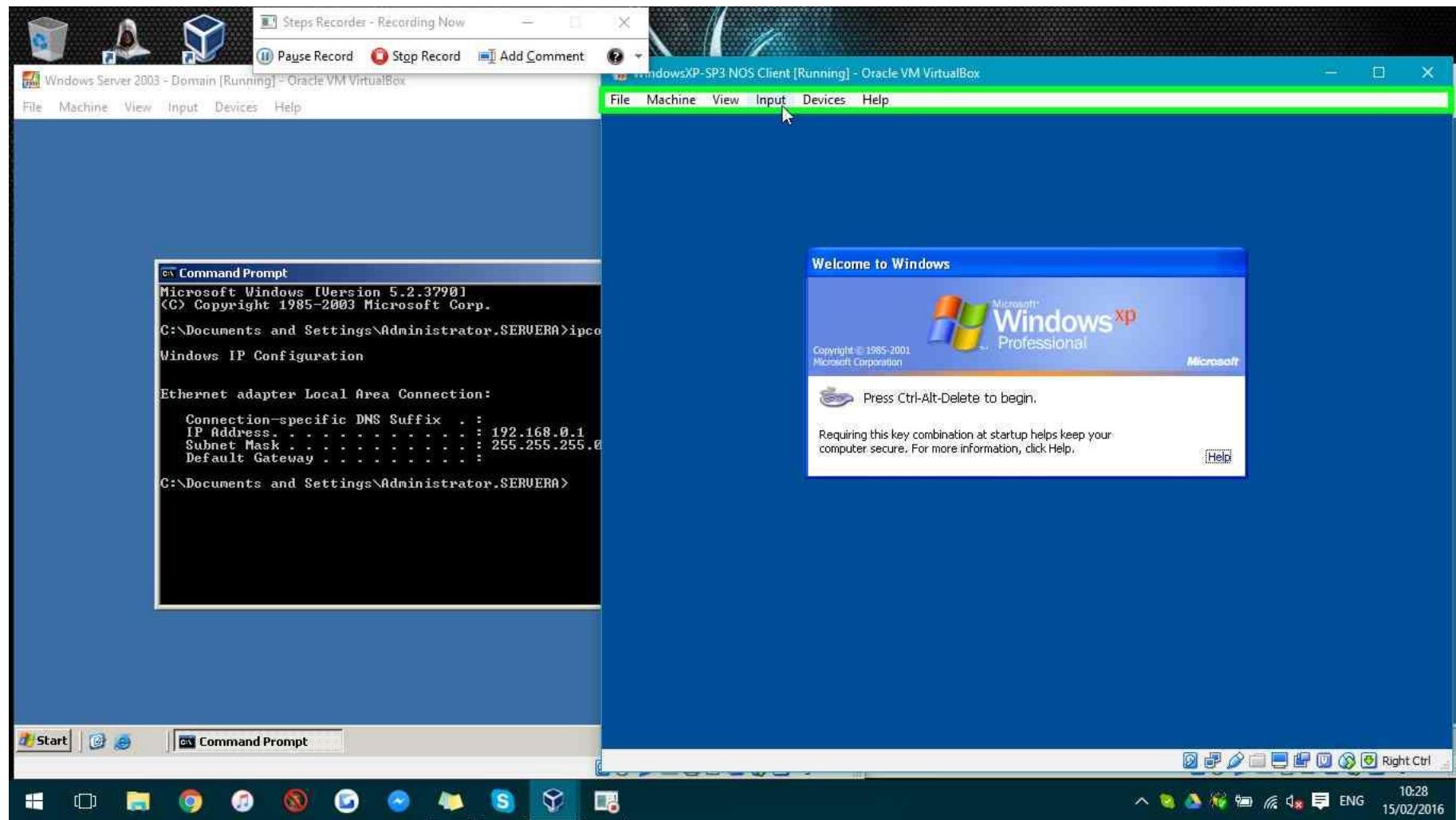


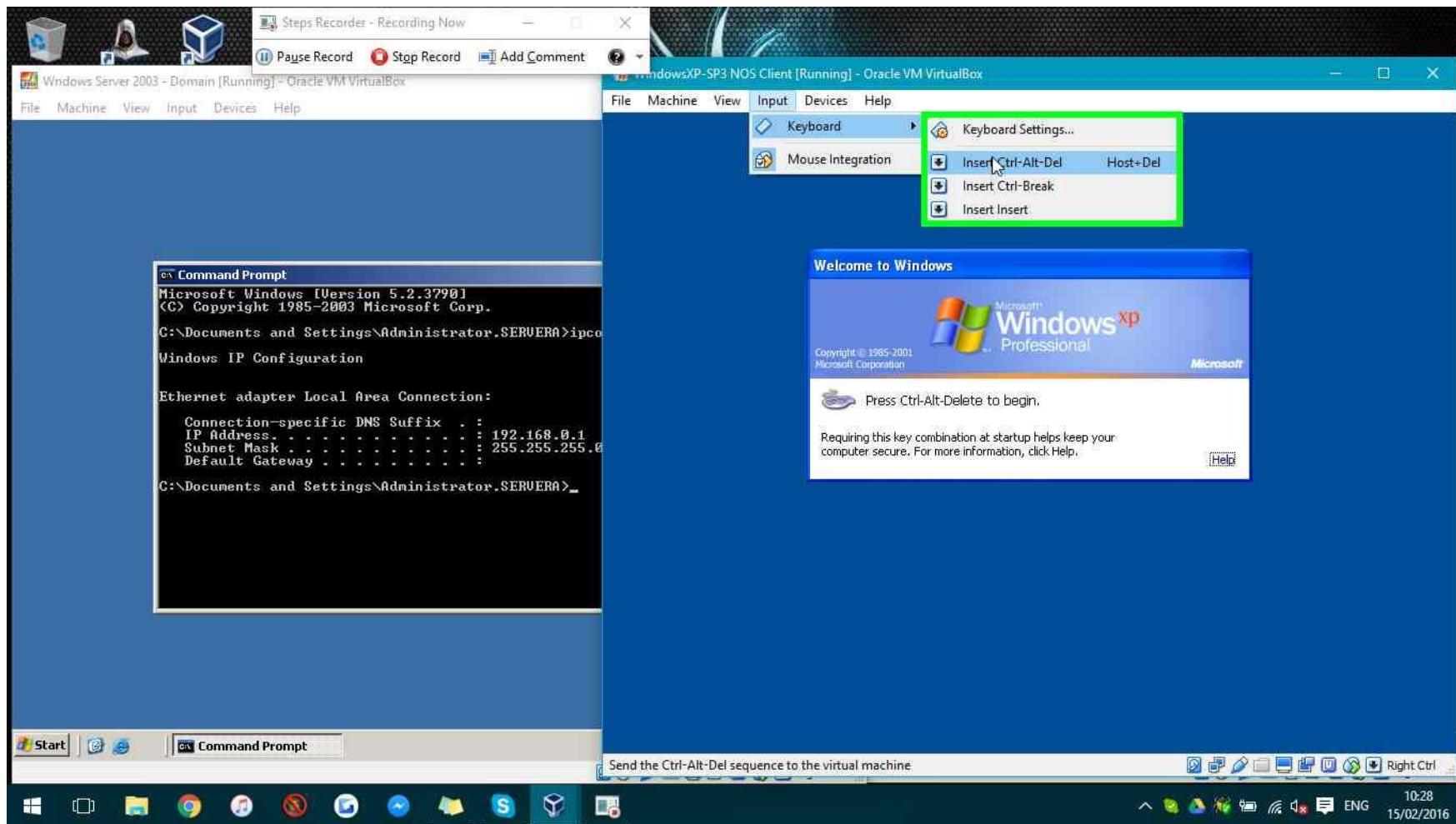


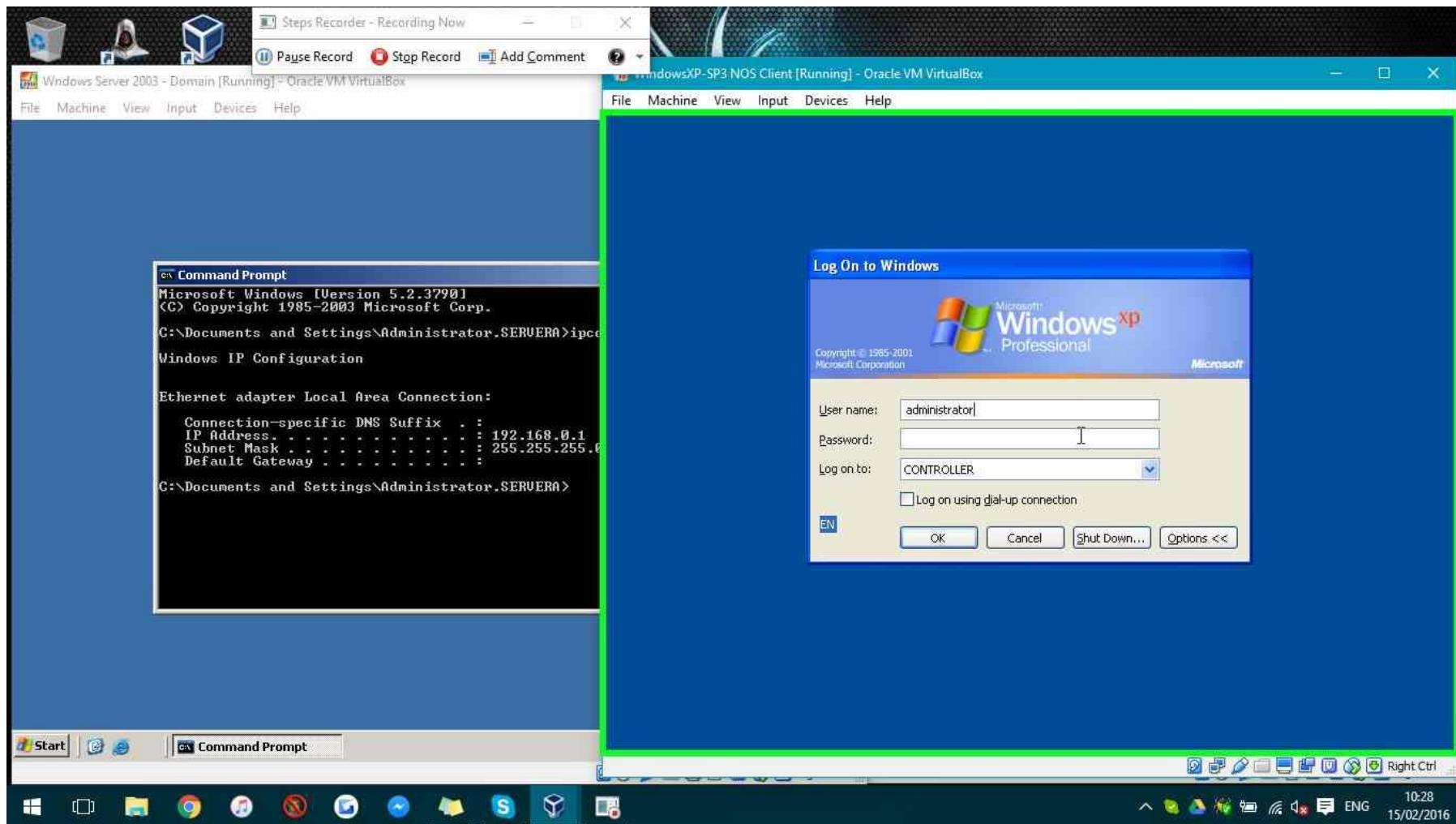






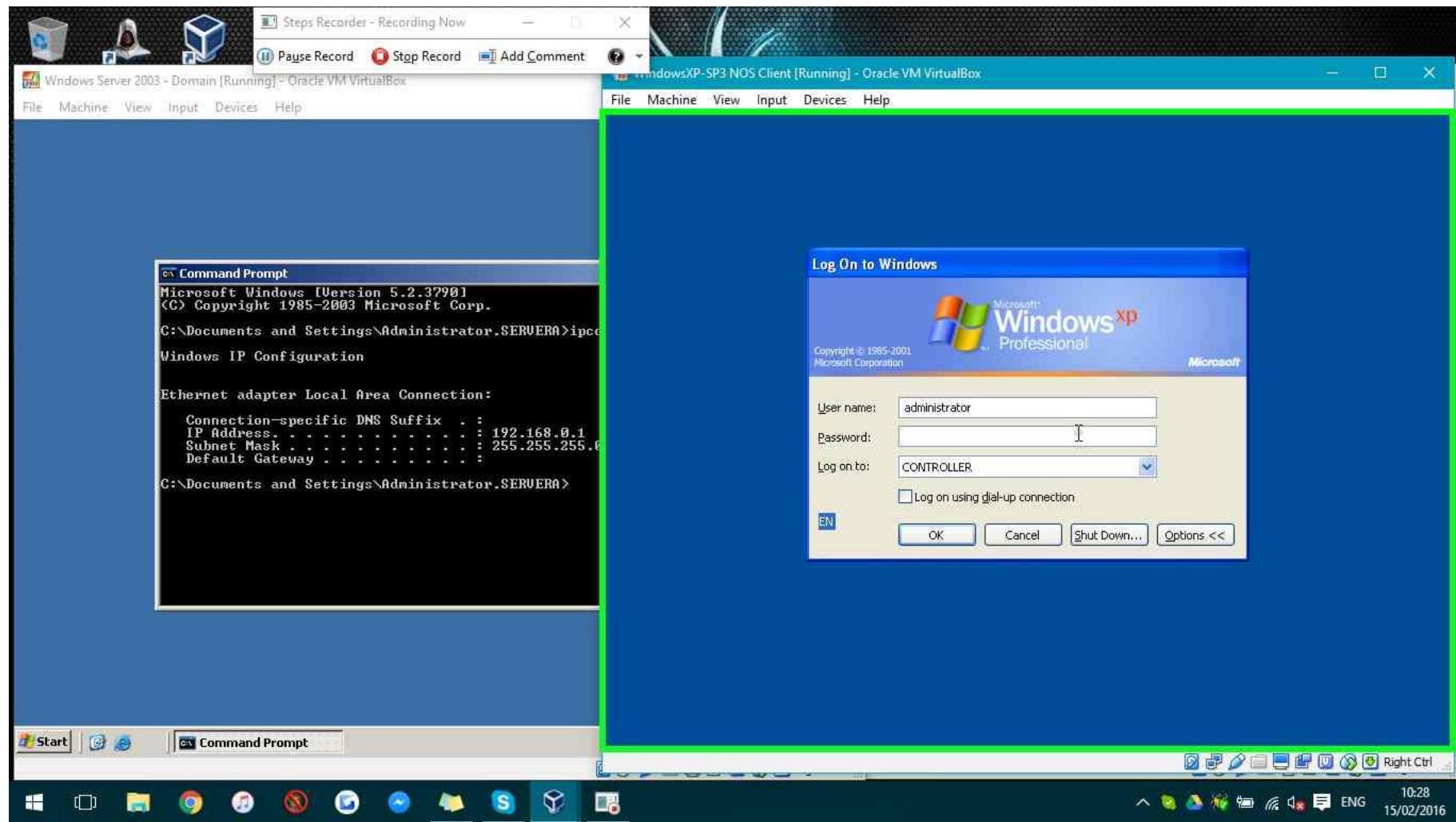


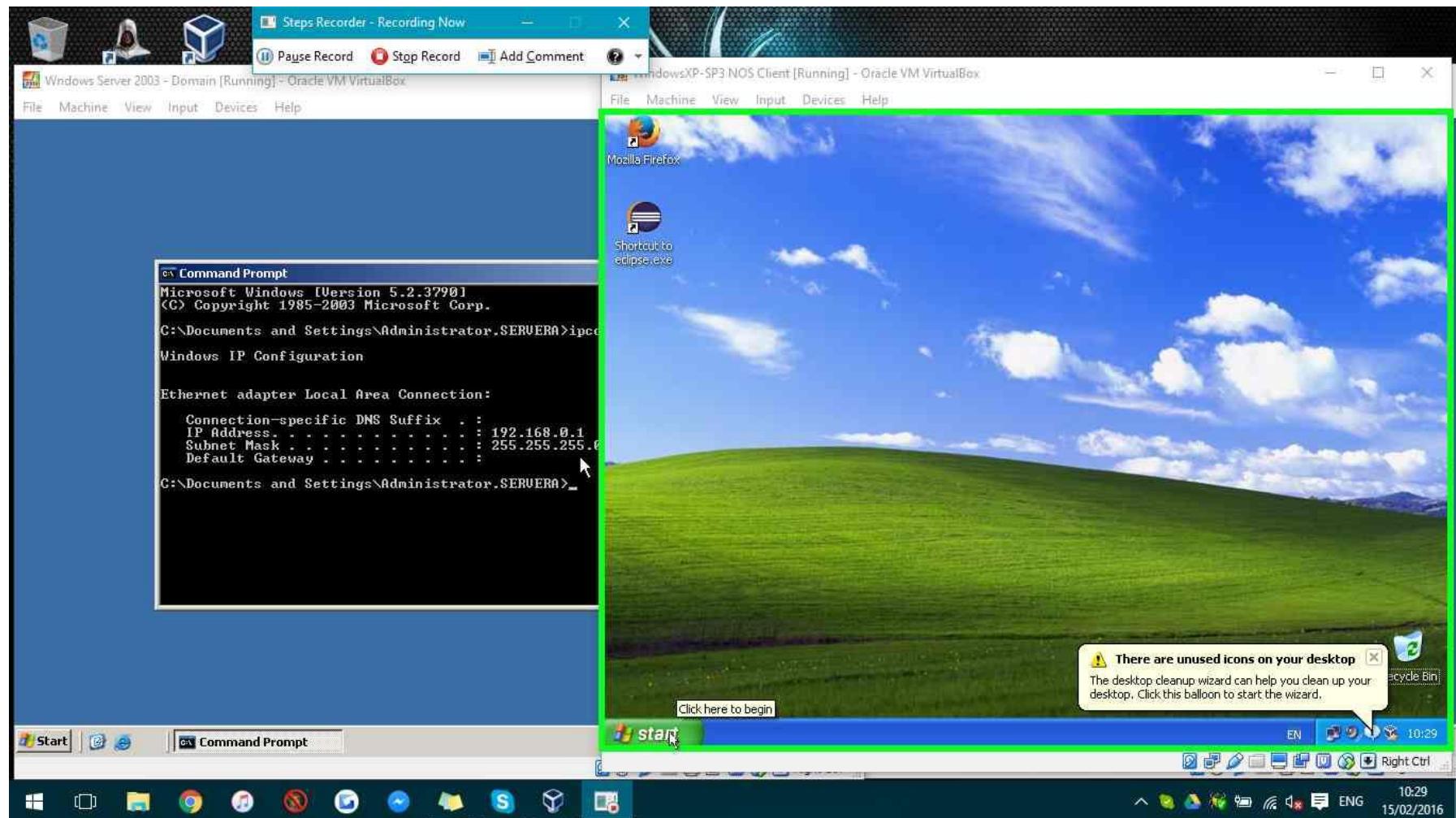


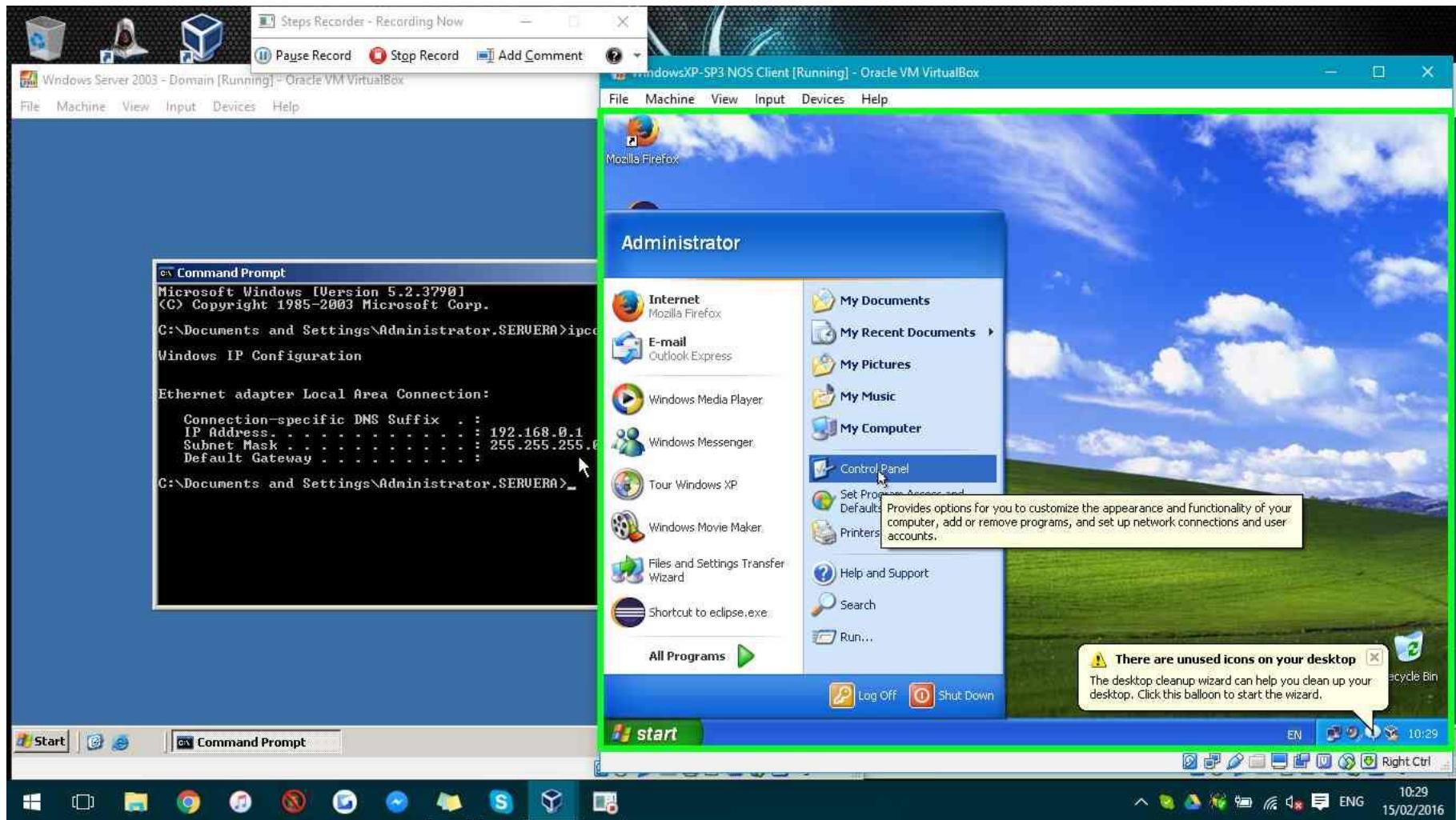


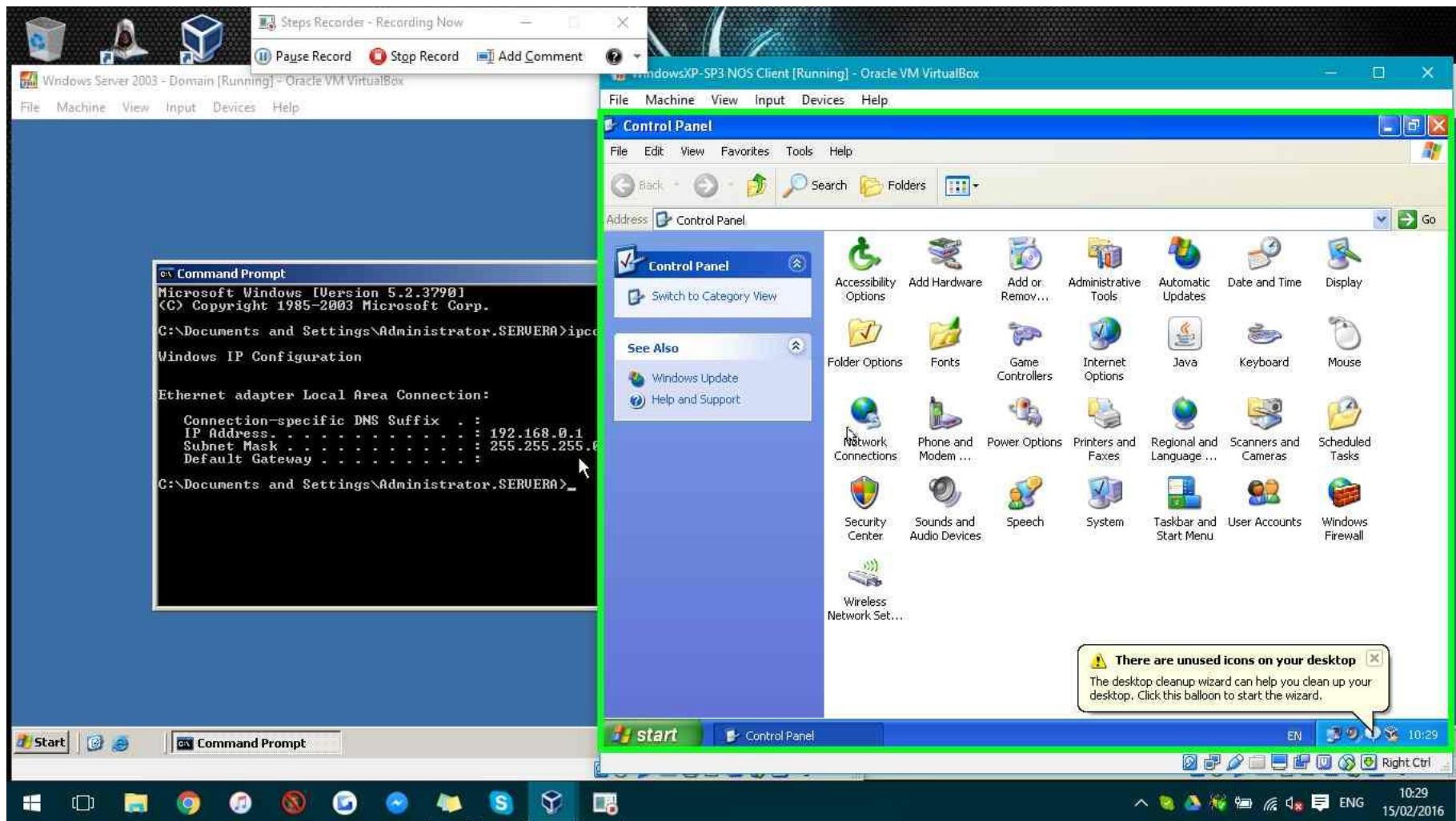
[Previous](#) [Next](#)

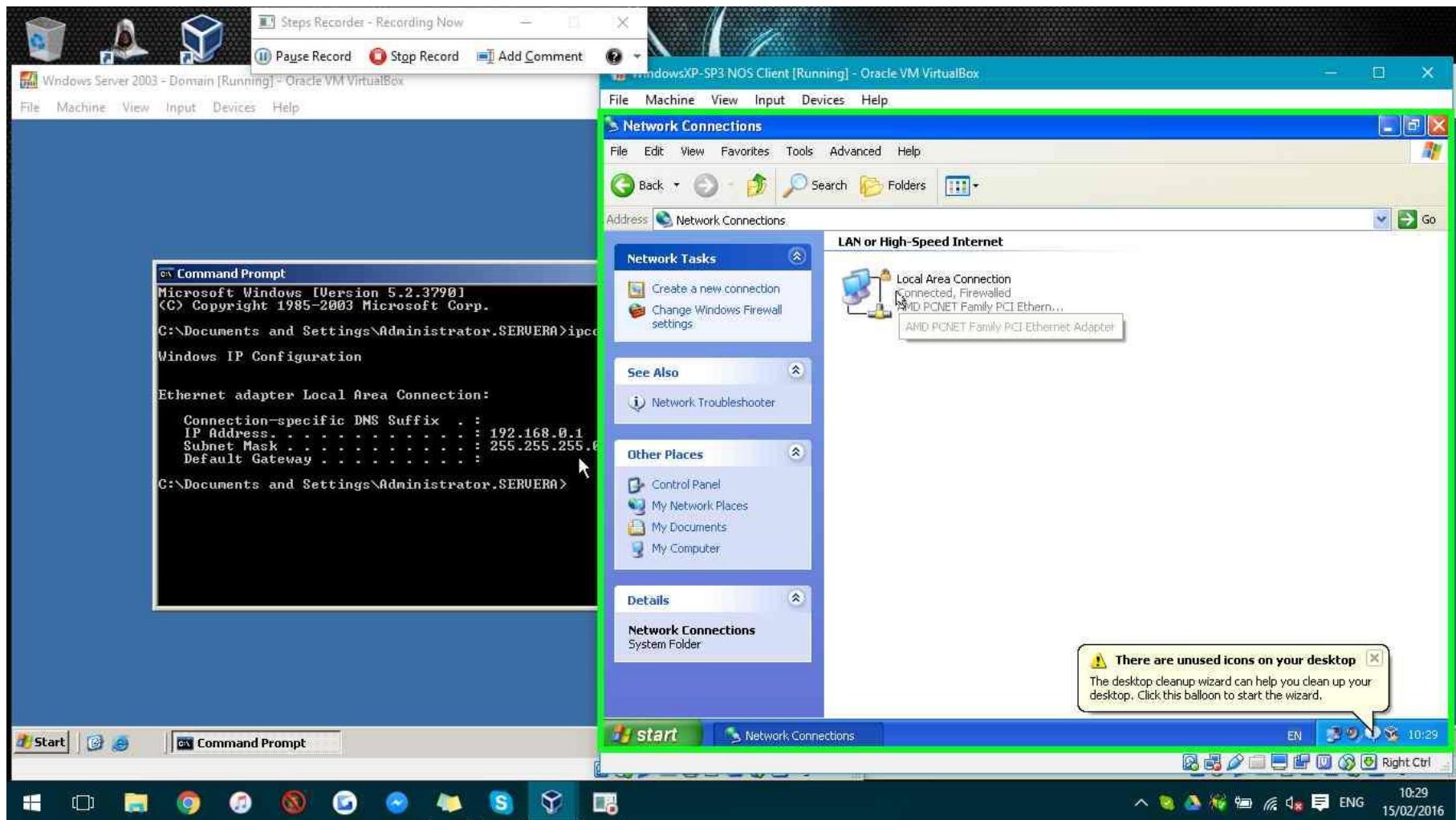
**Step 36: (15/02/2016 10:28:50)** User keyboard input on "WindowsXP-SP3 NOS Client [Running] - Oracle VM VirtualBox (window)" in "WindowsXP-SP3 NOS Client [Running] - Oracle VM VirtualBox" [CAPSLOCK CAPSLOCK CAPSLOCK ...]

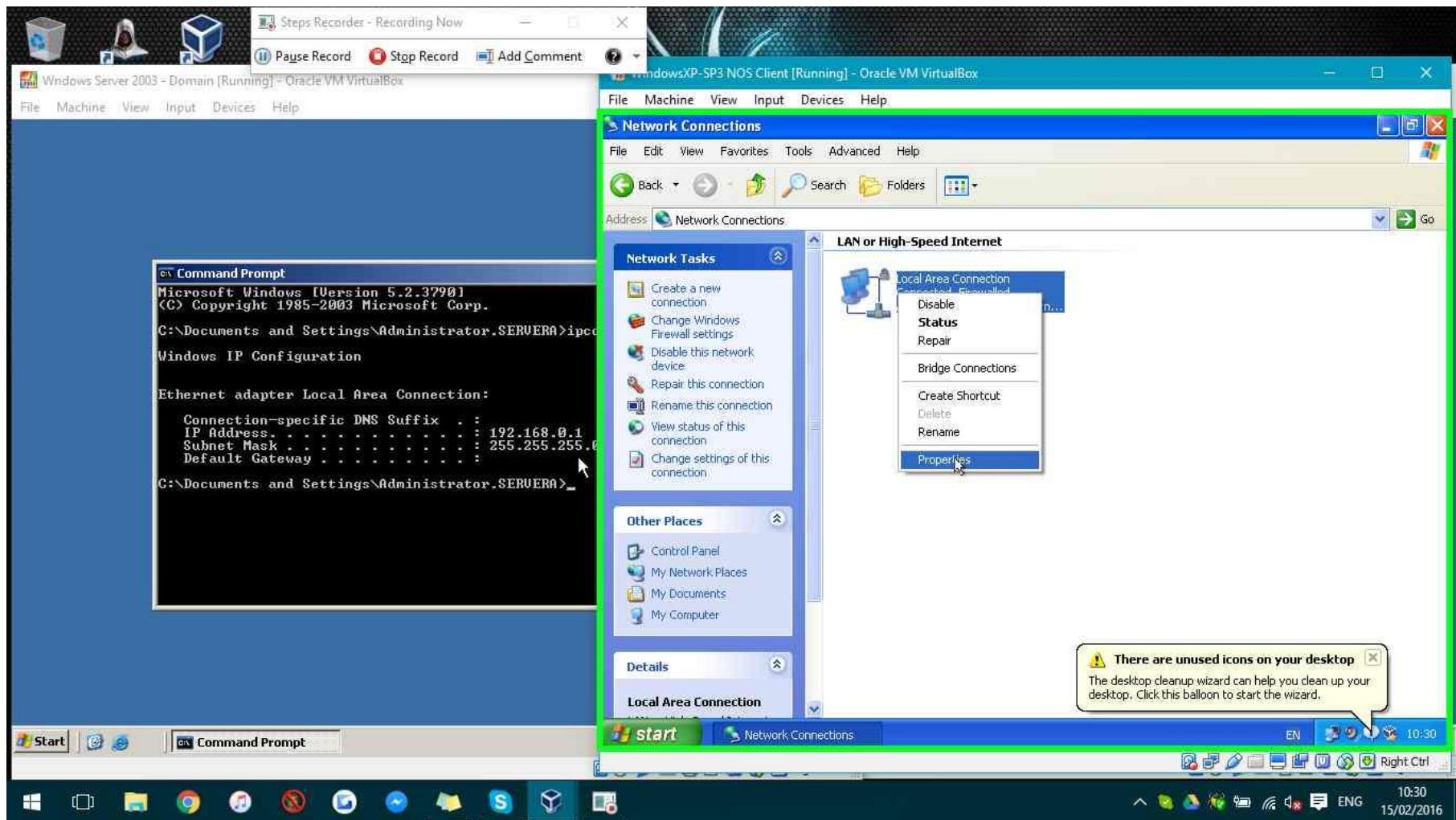


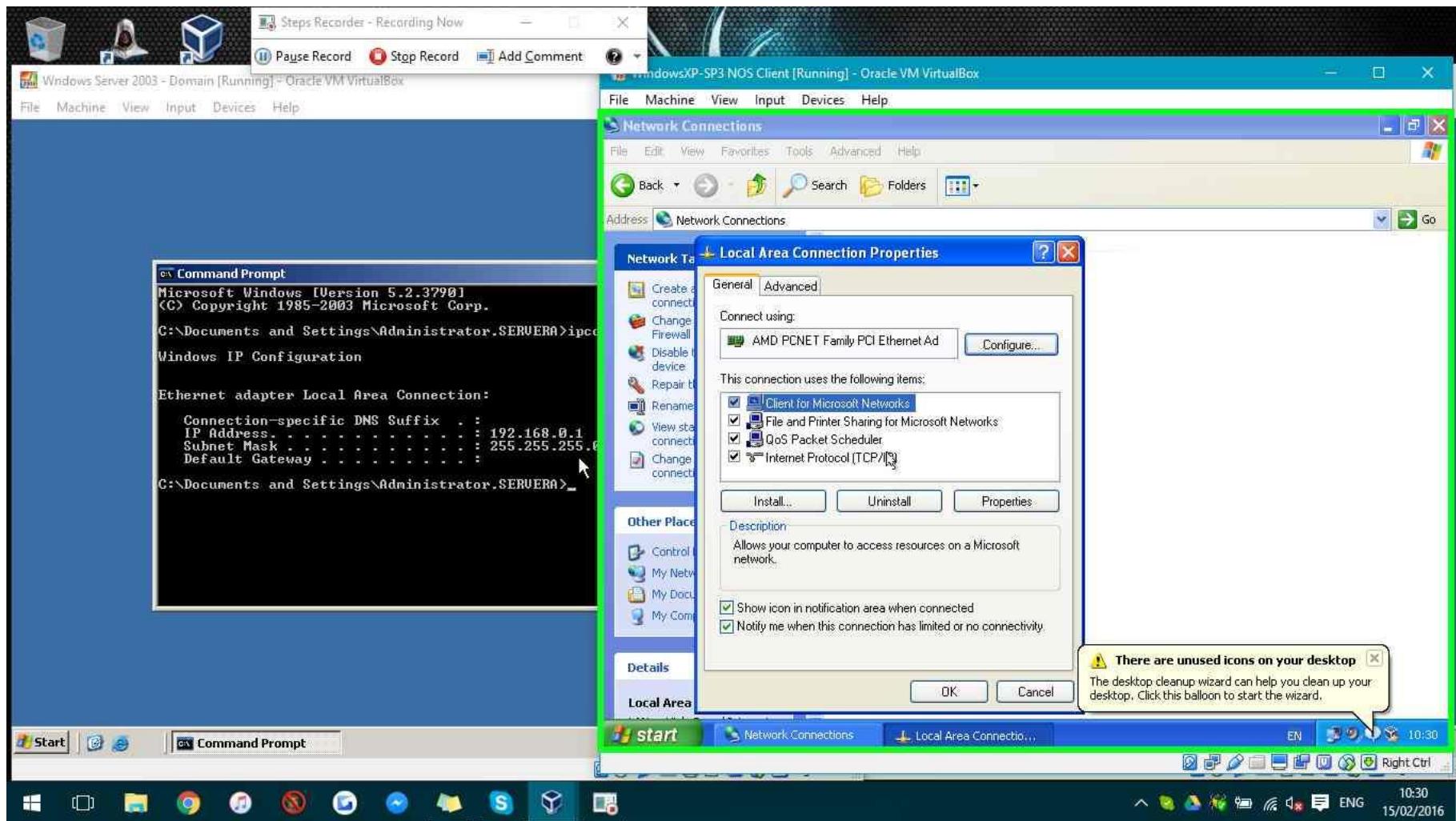


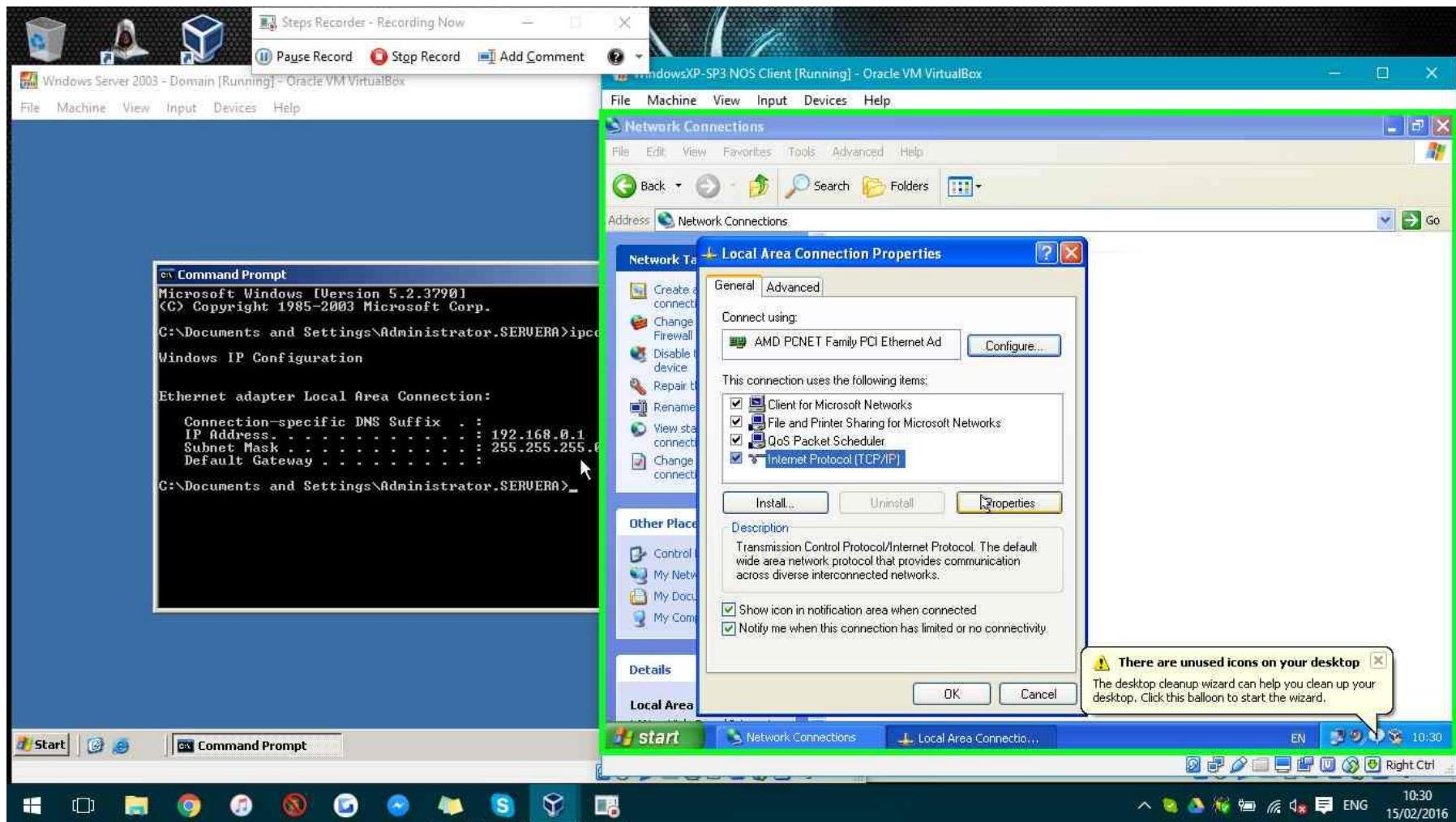


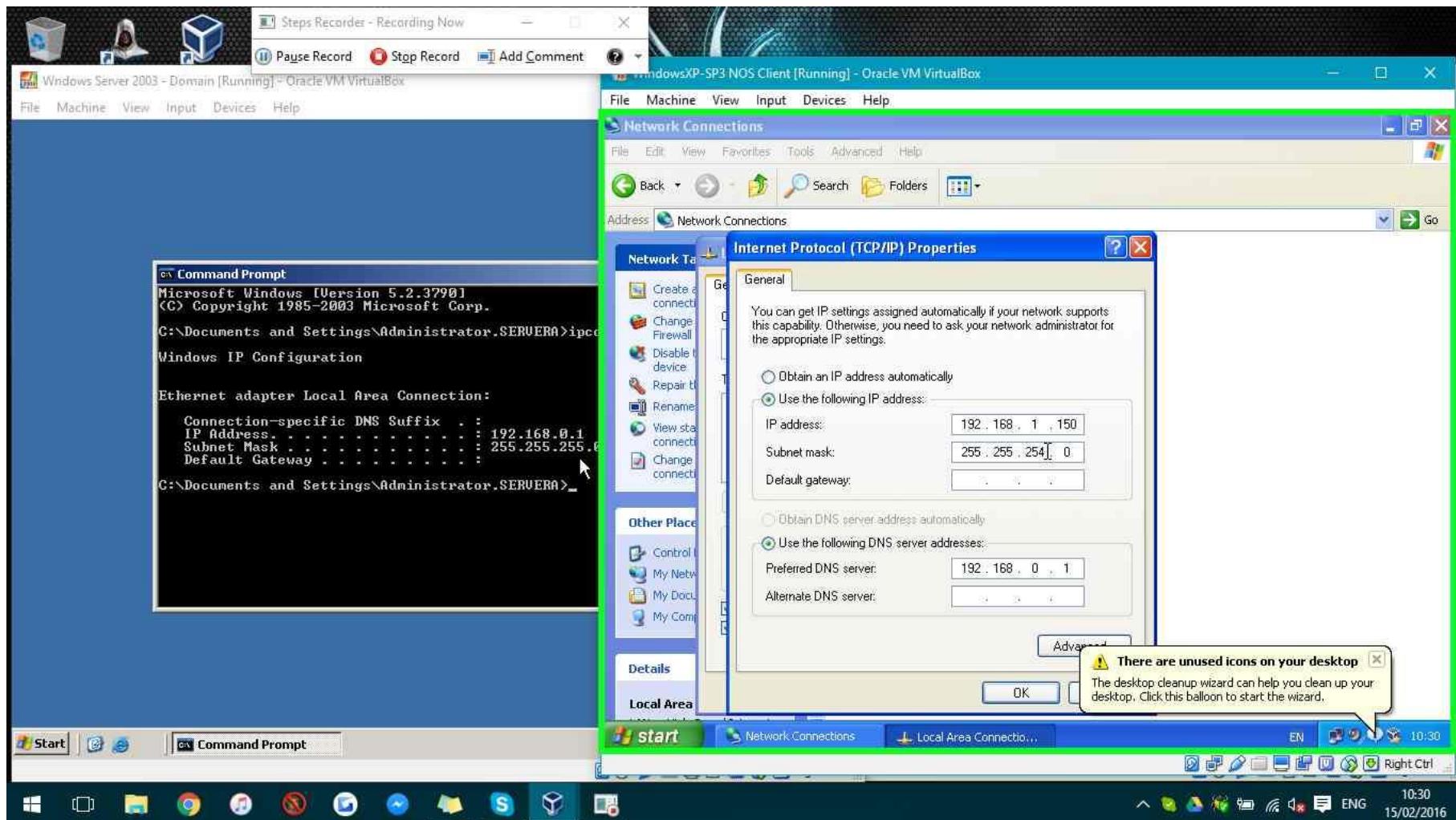


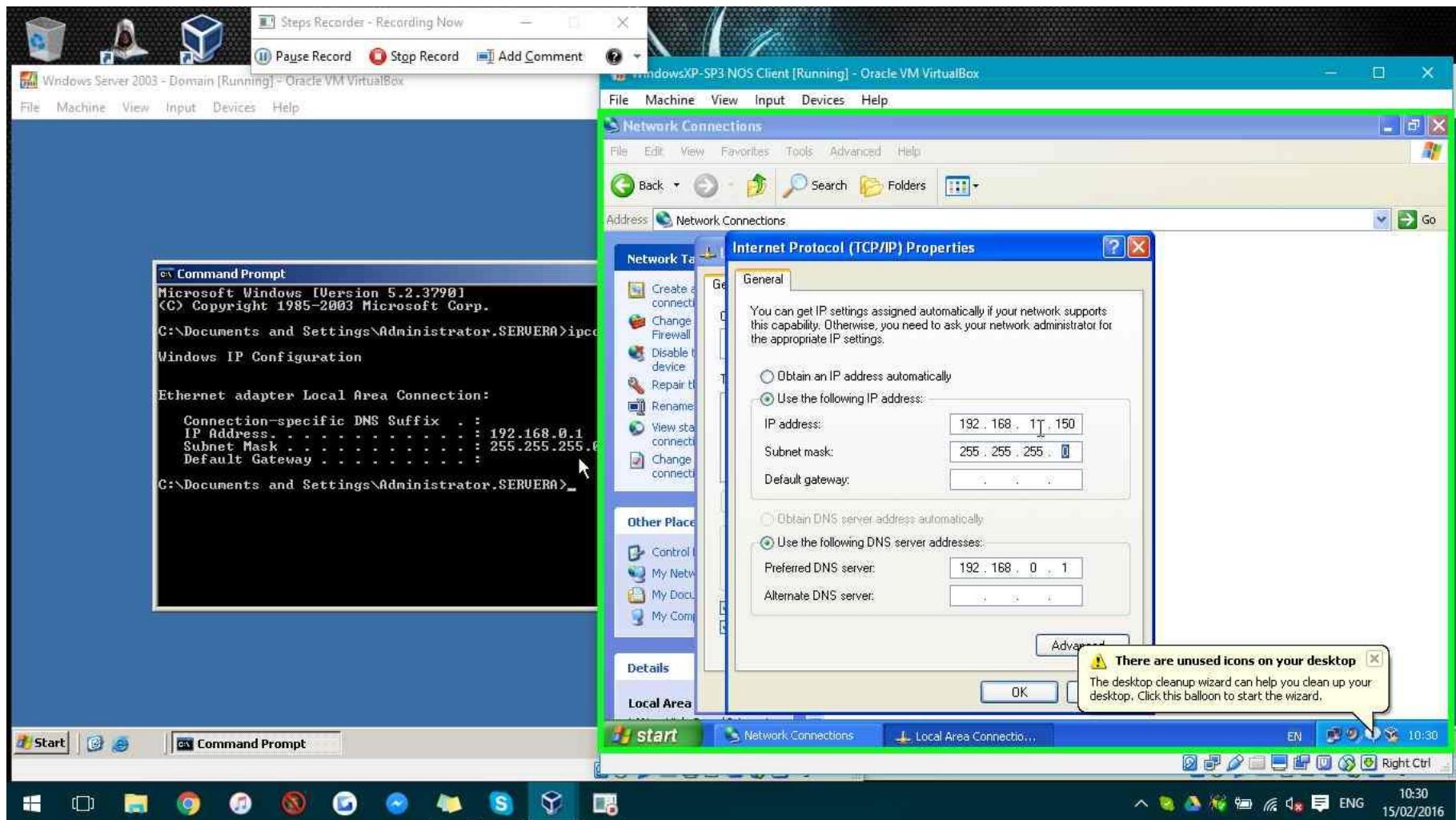


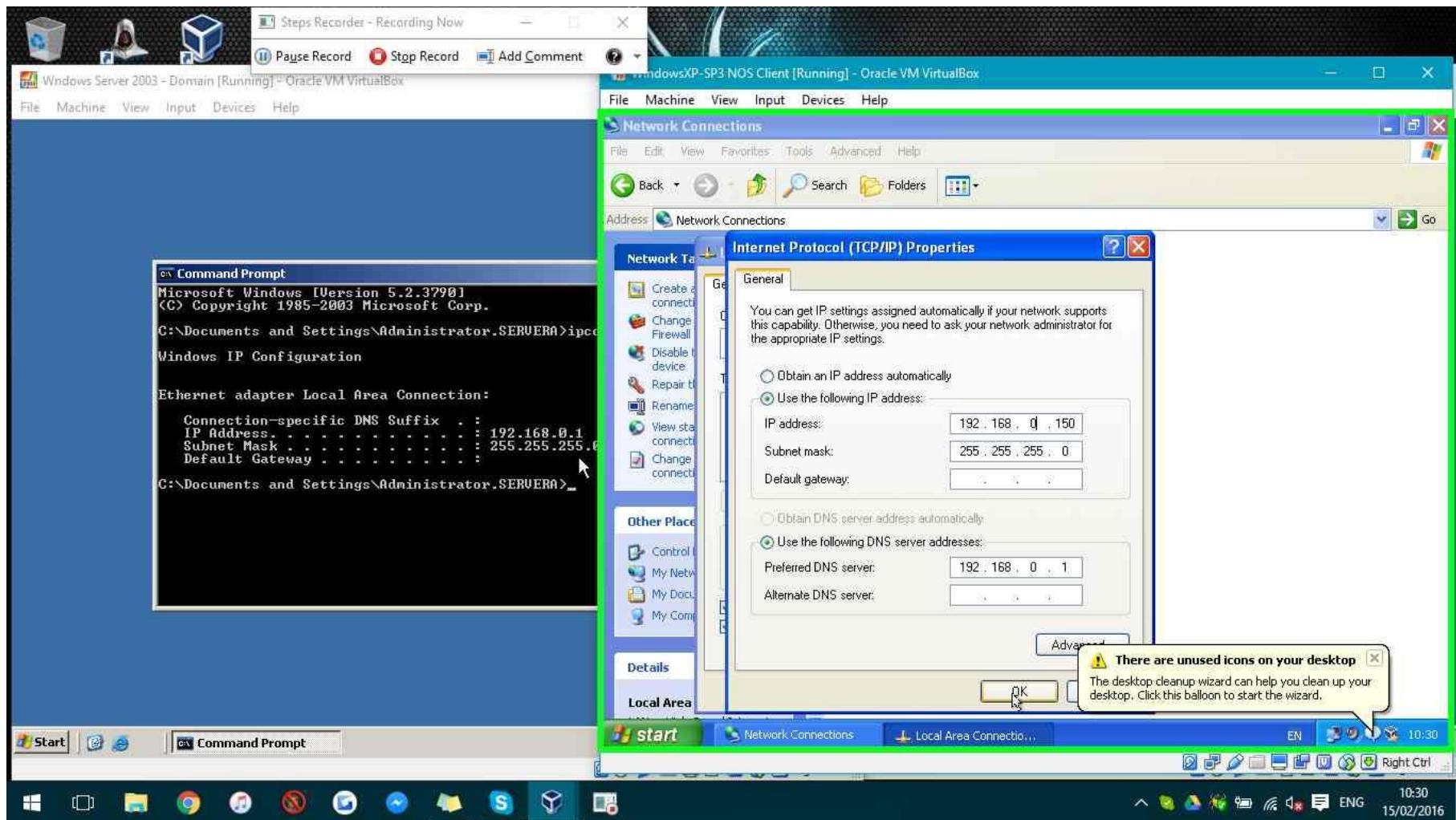


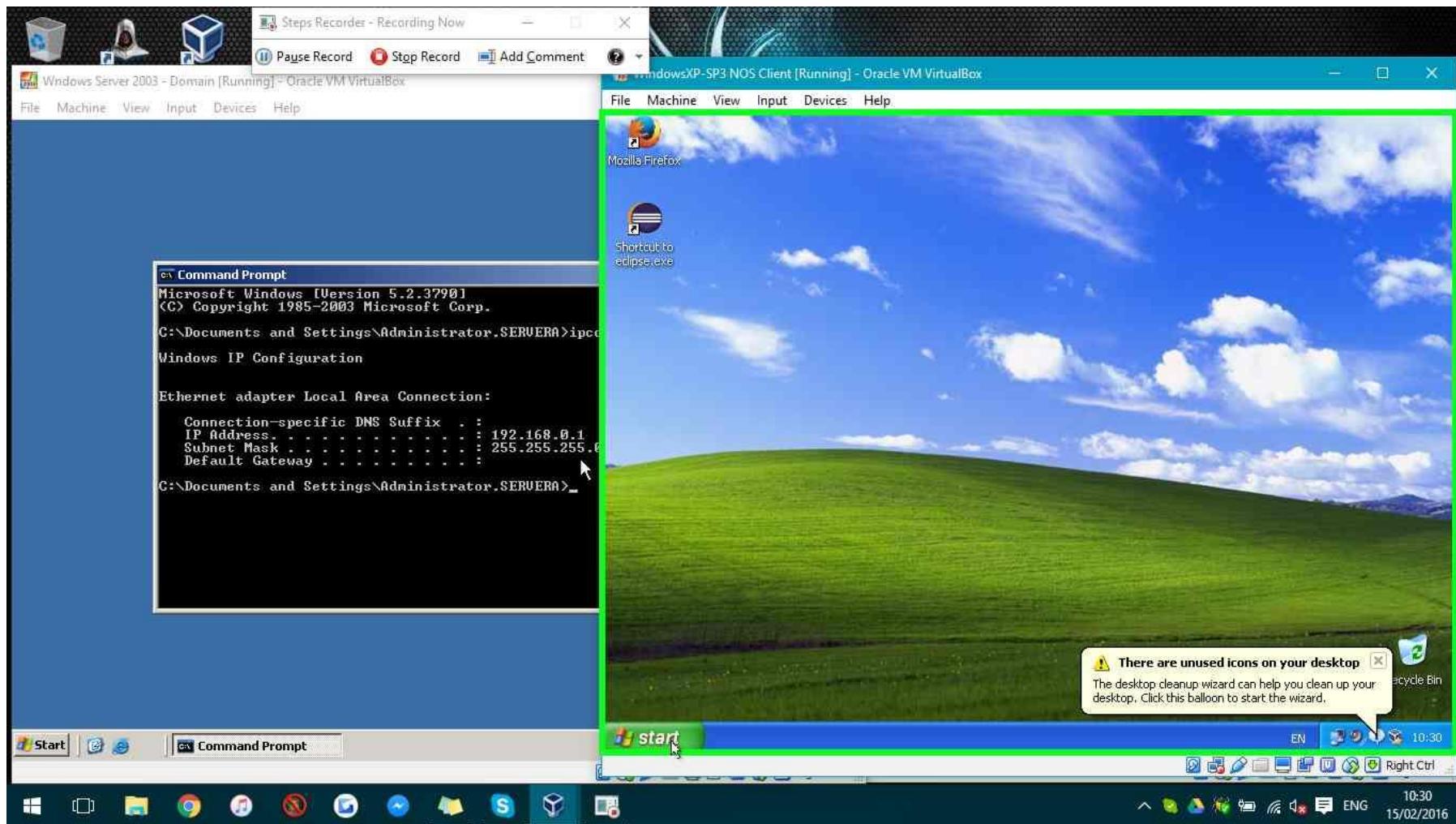


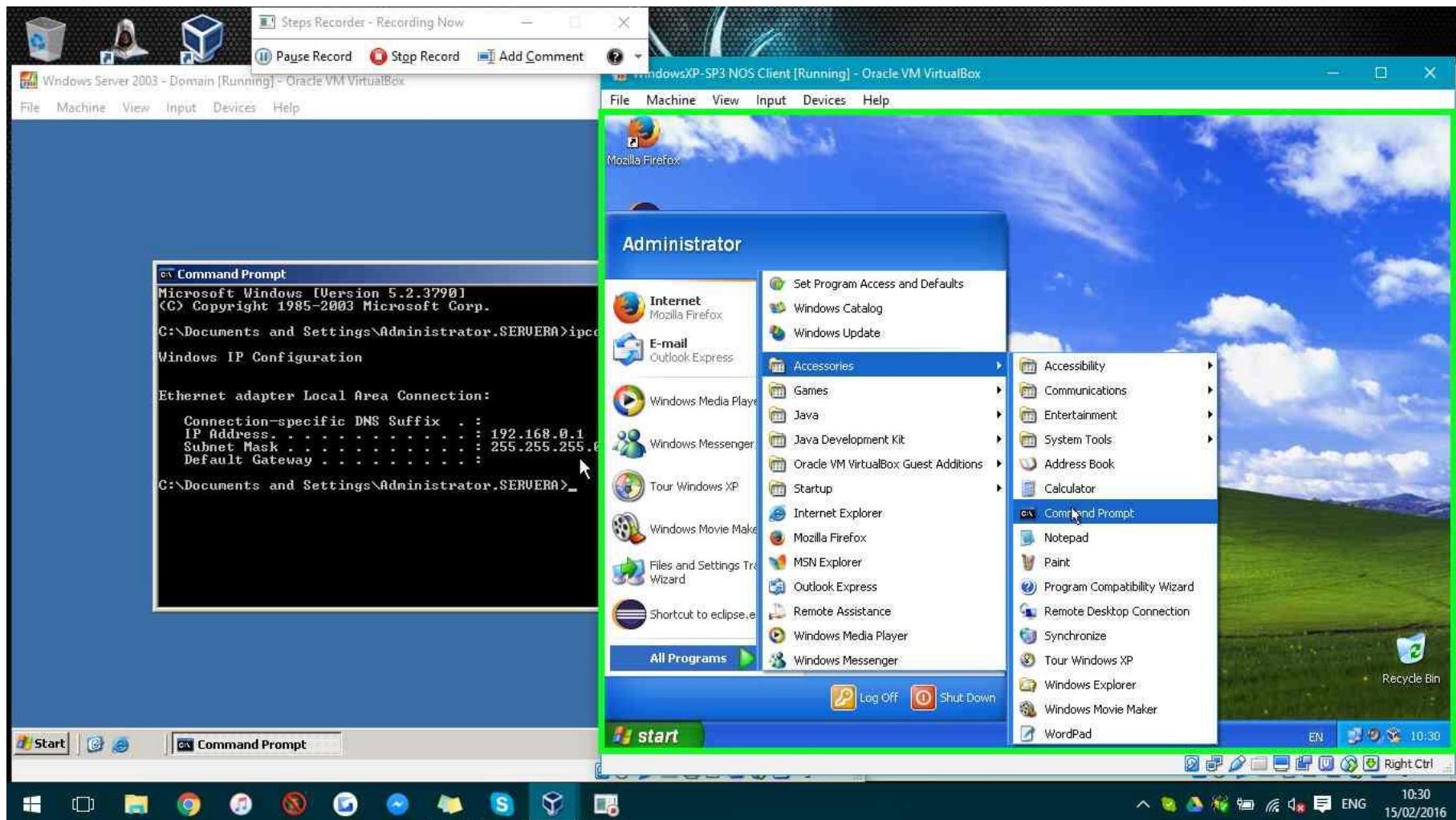


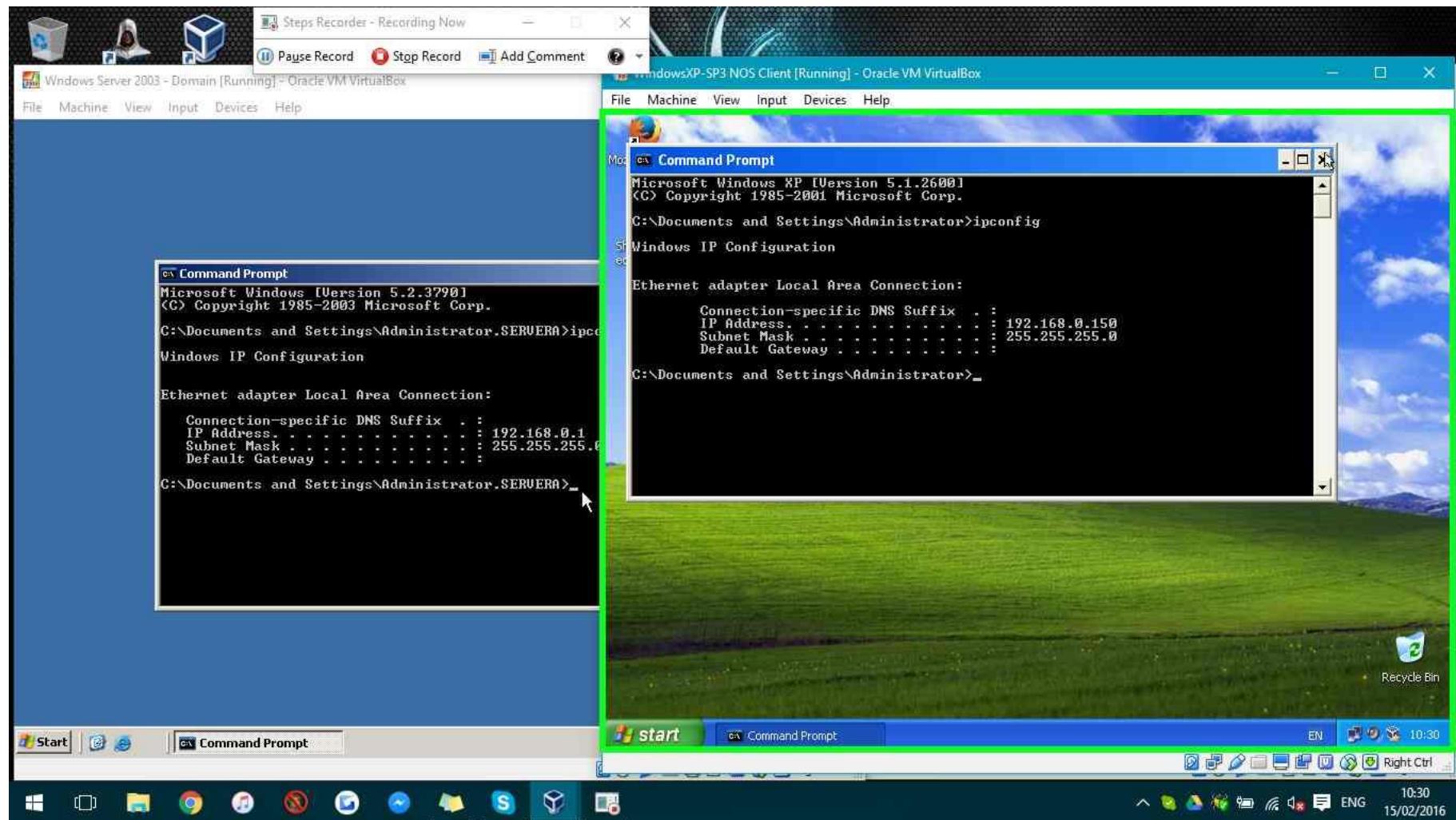


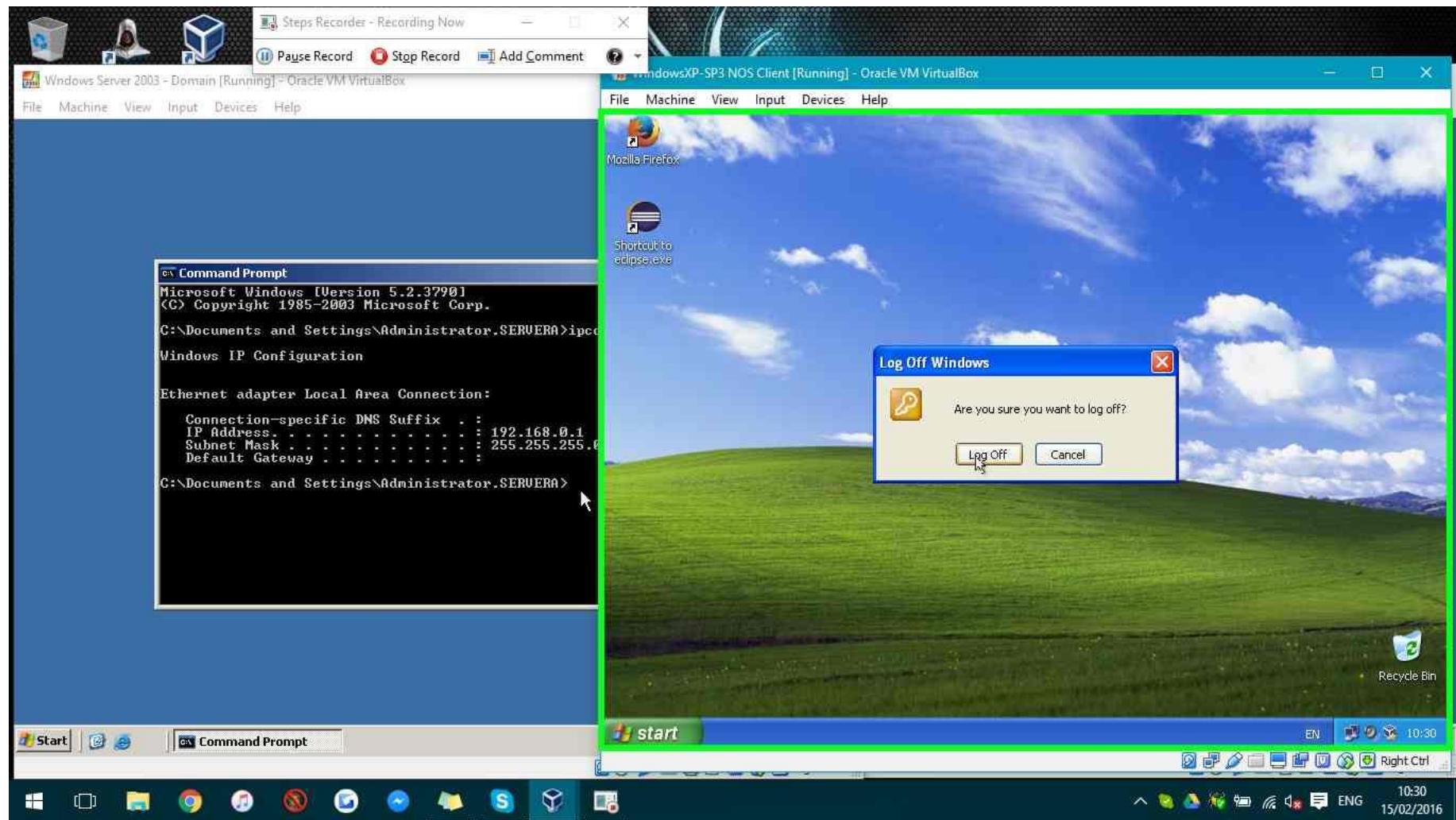


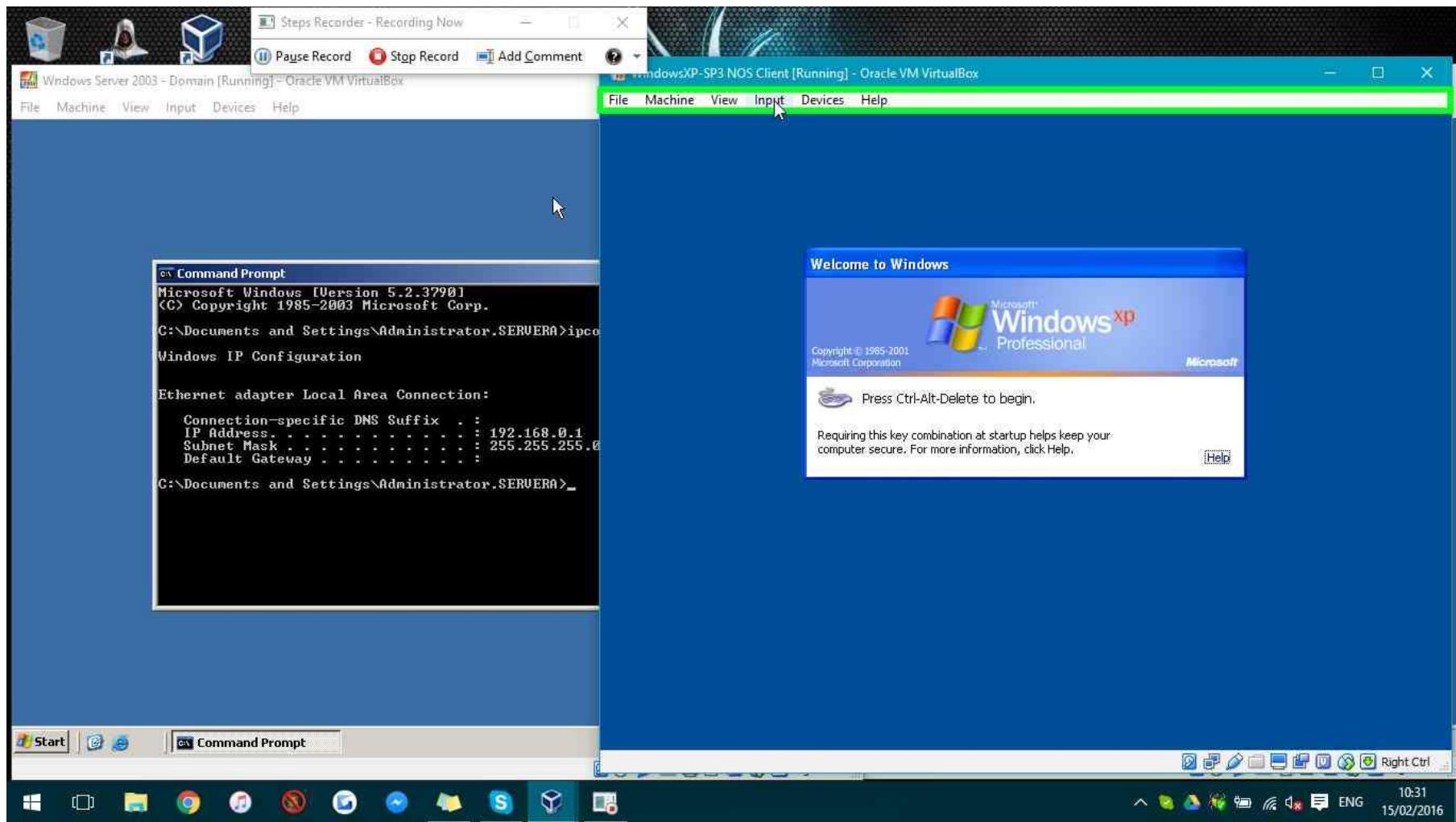


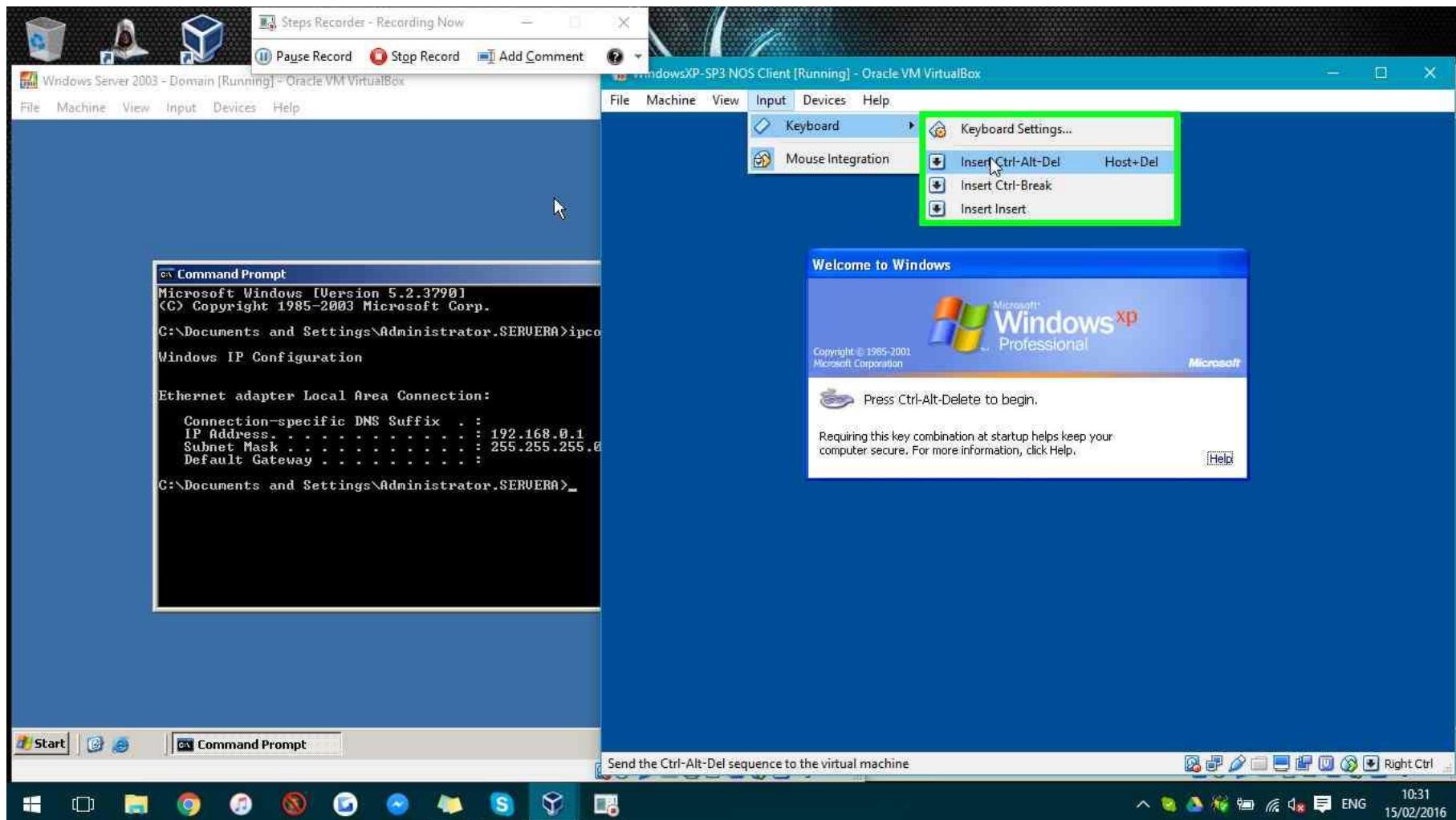


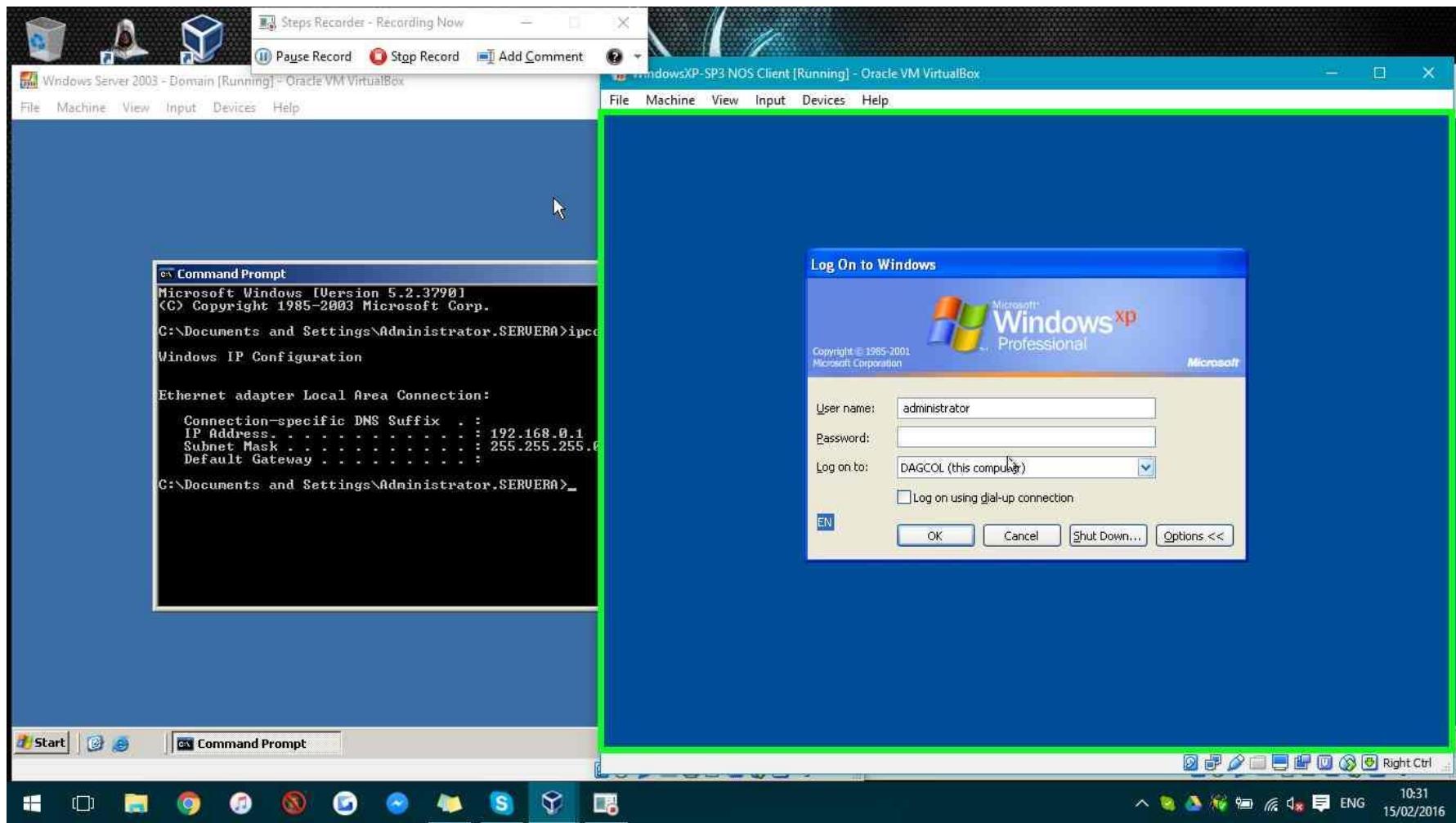


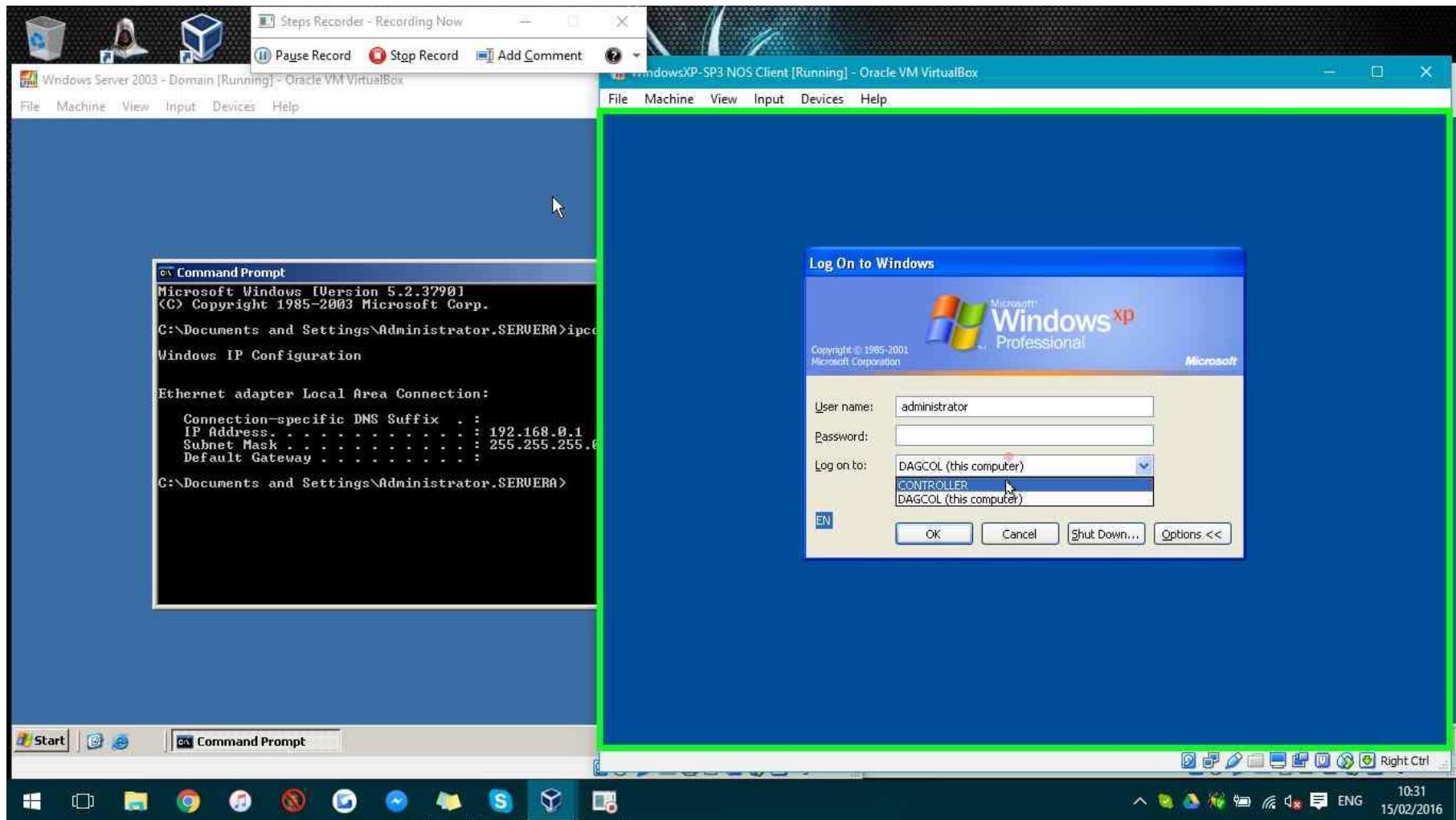


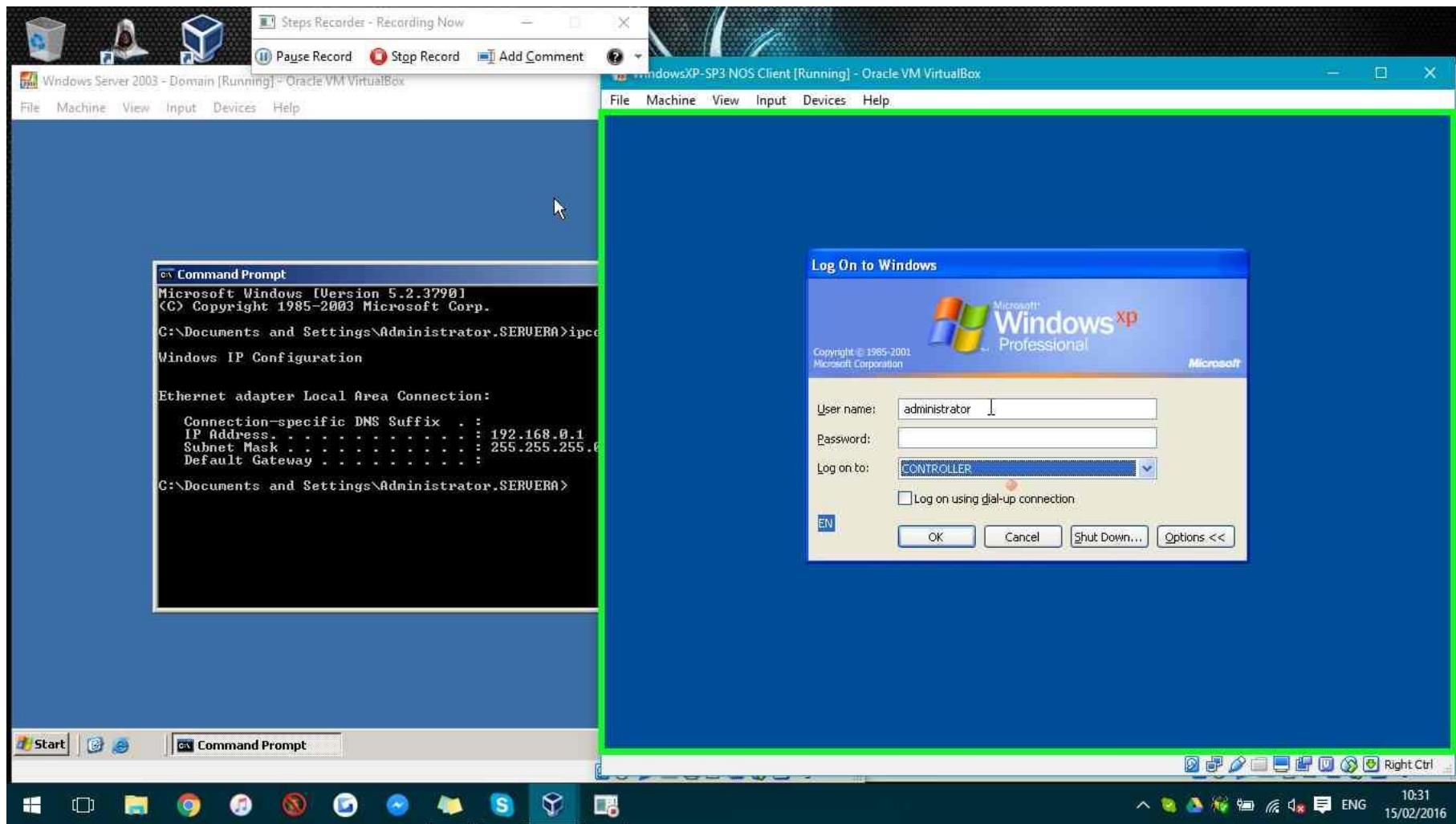


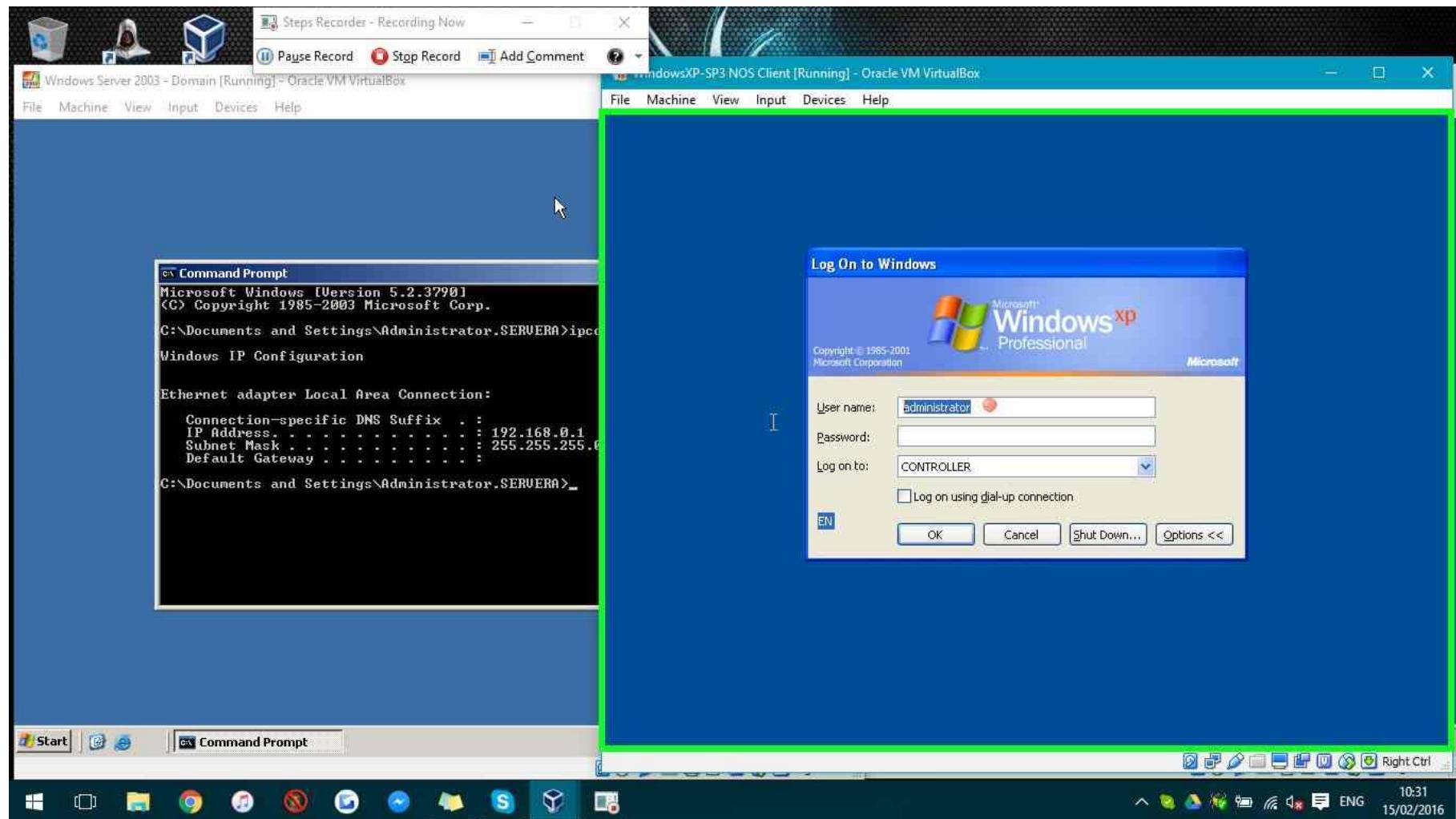


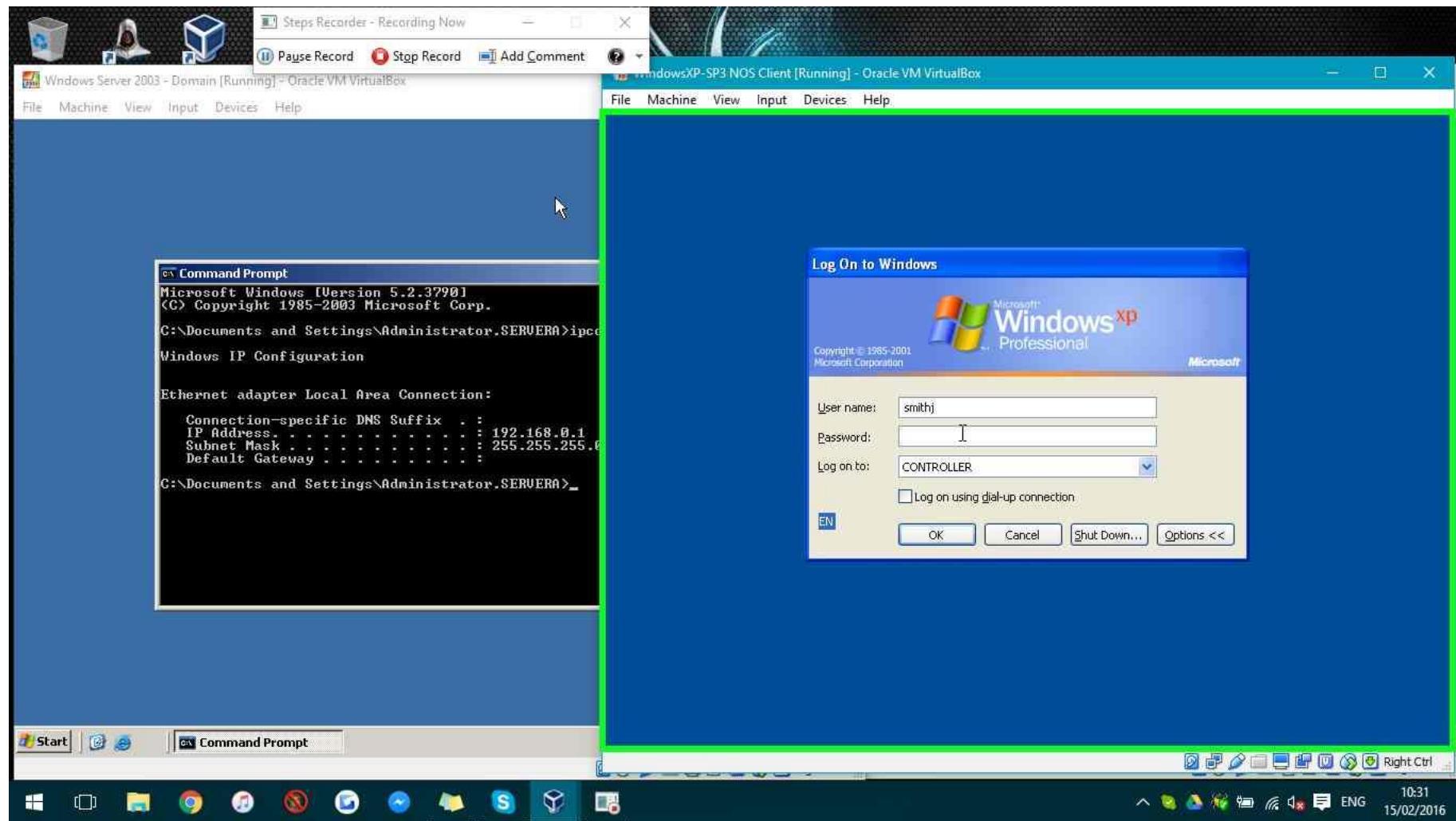


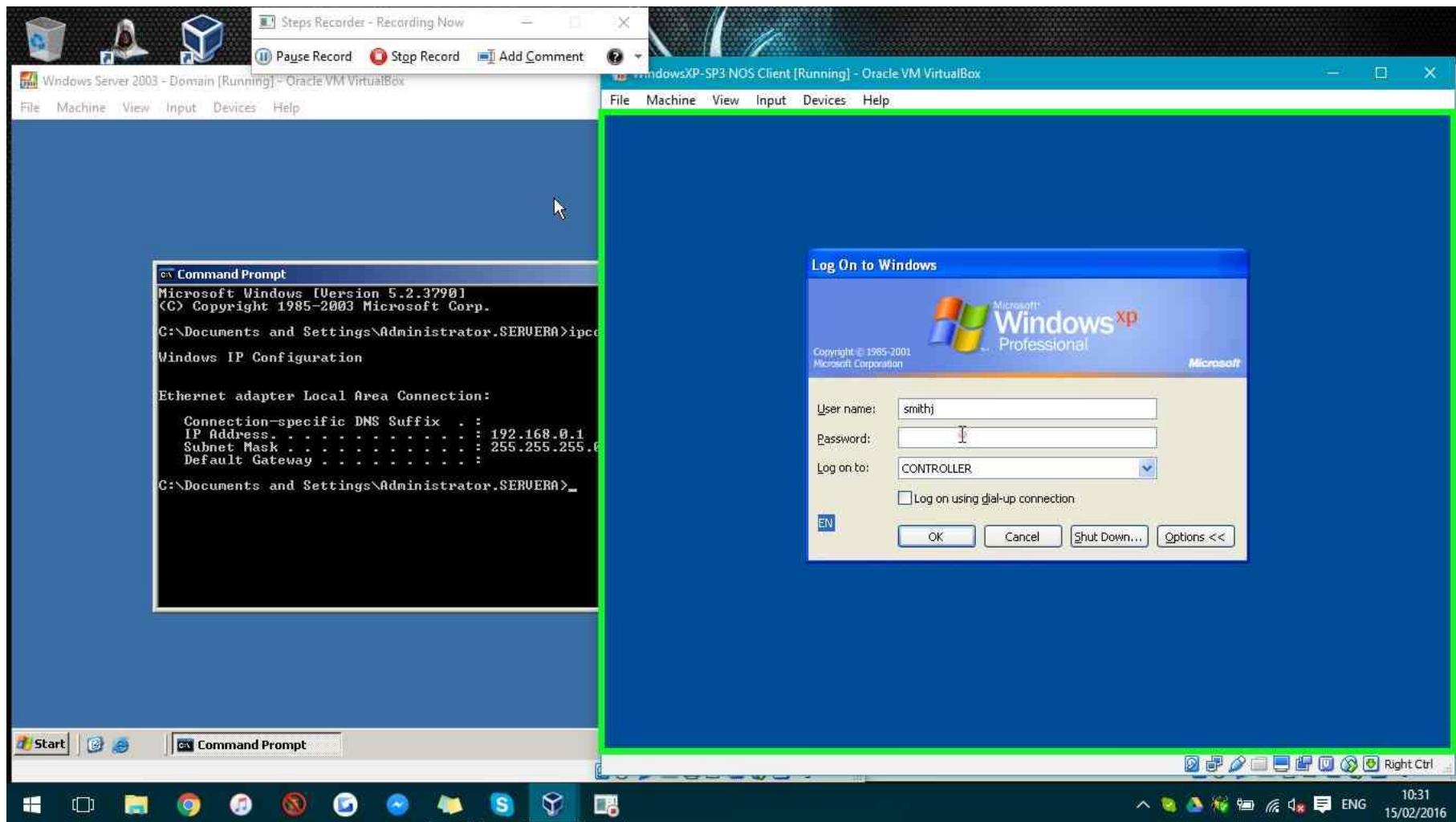


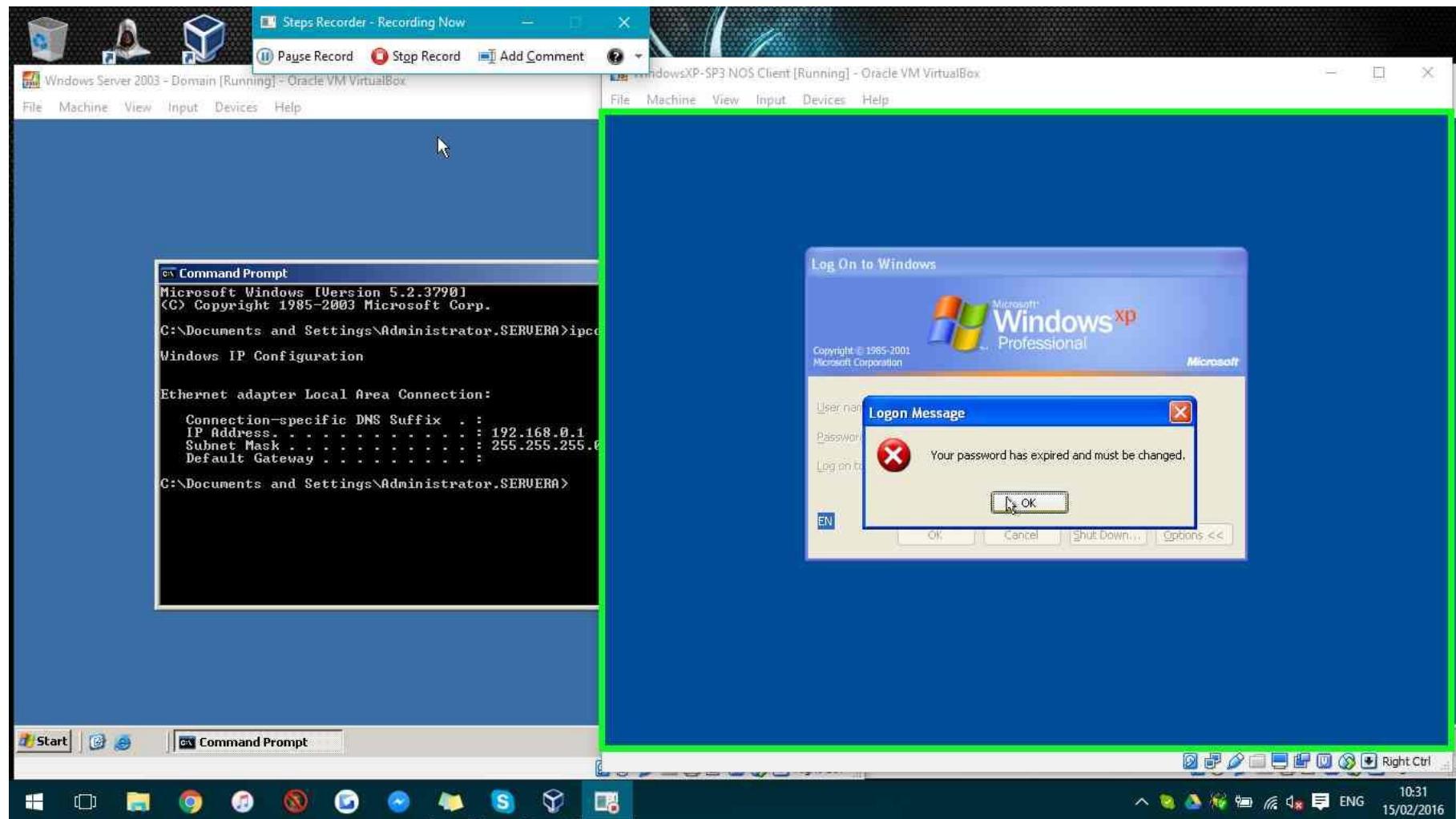


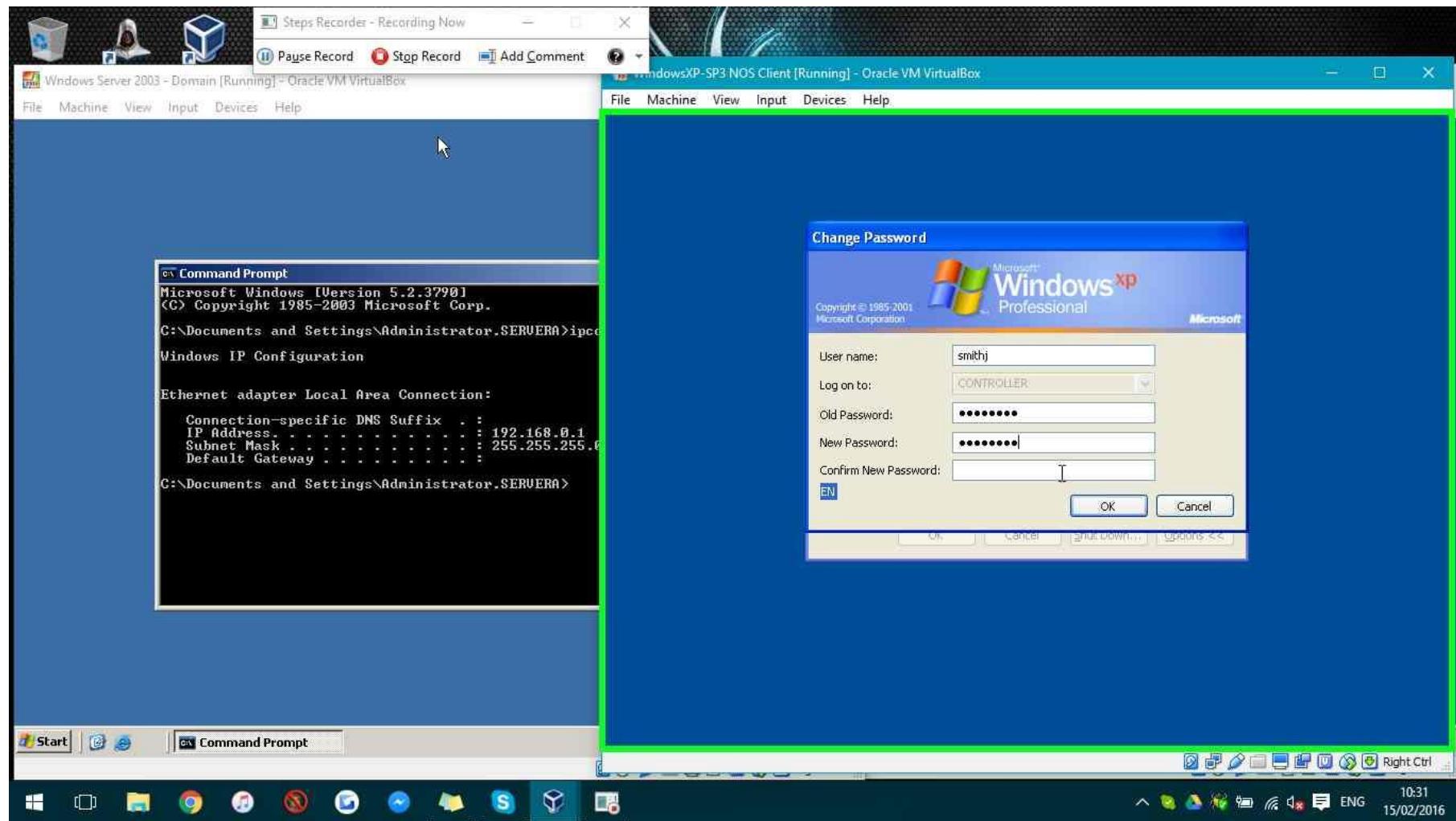










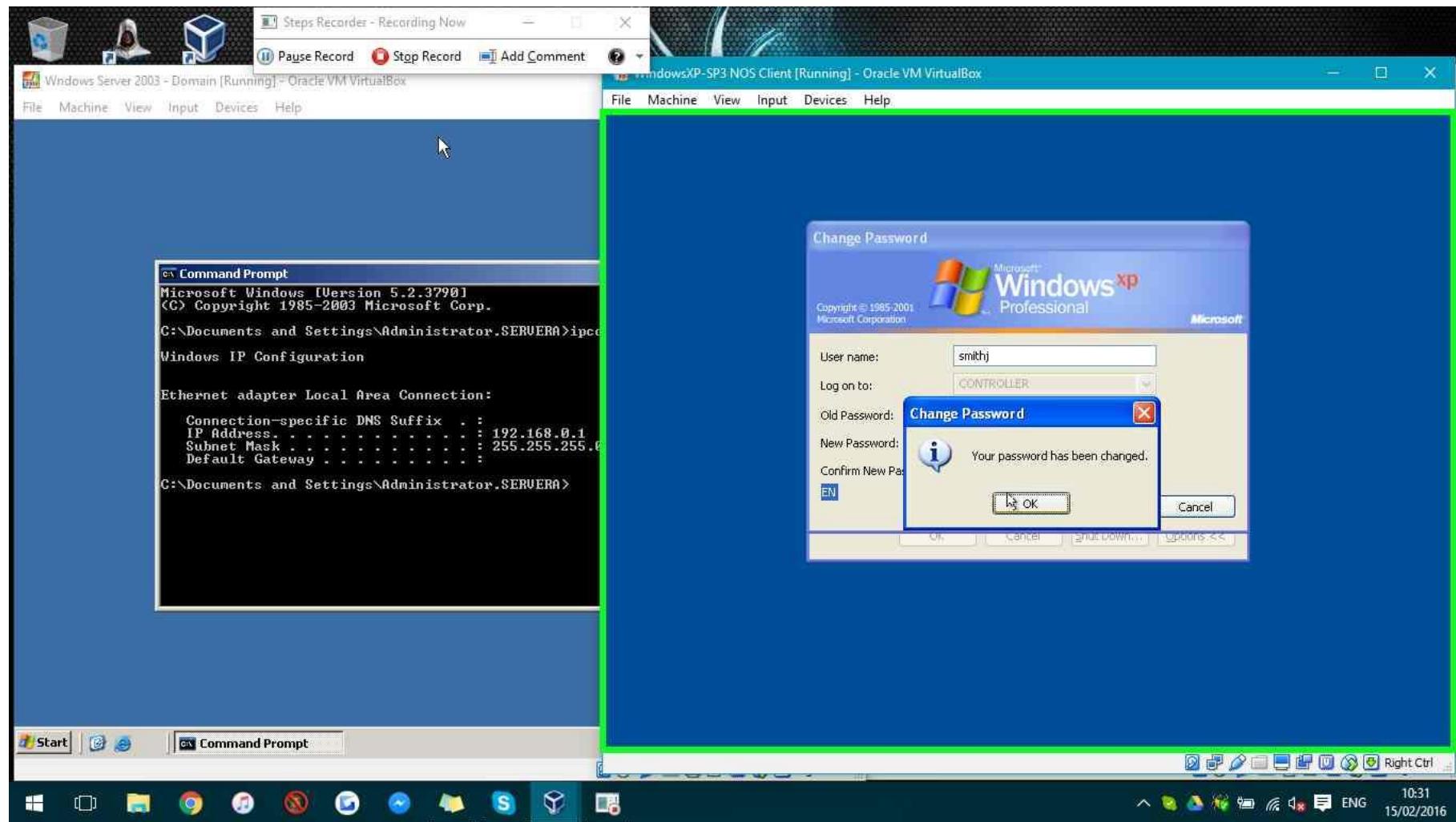


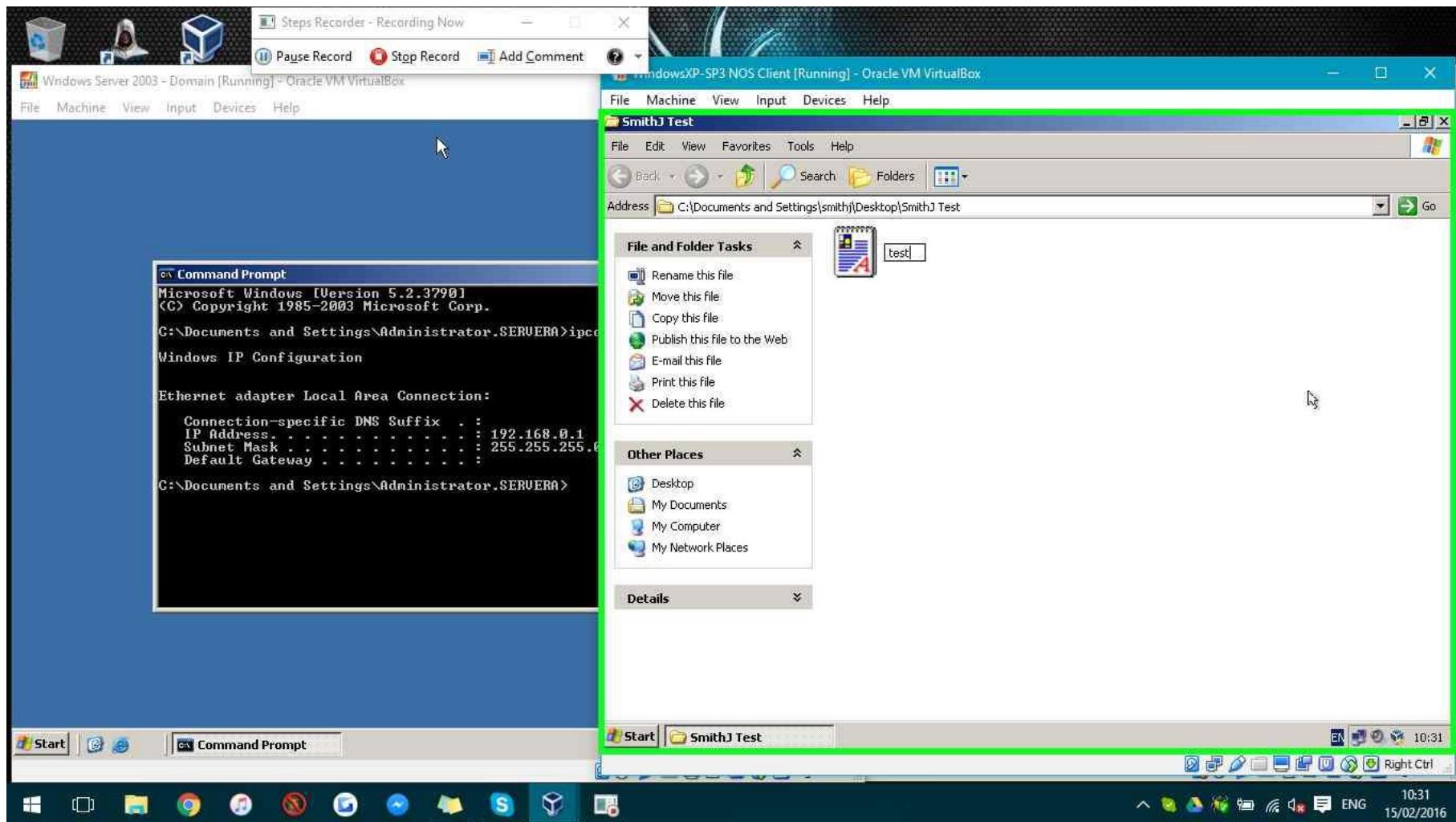
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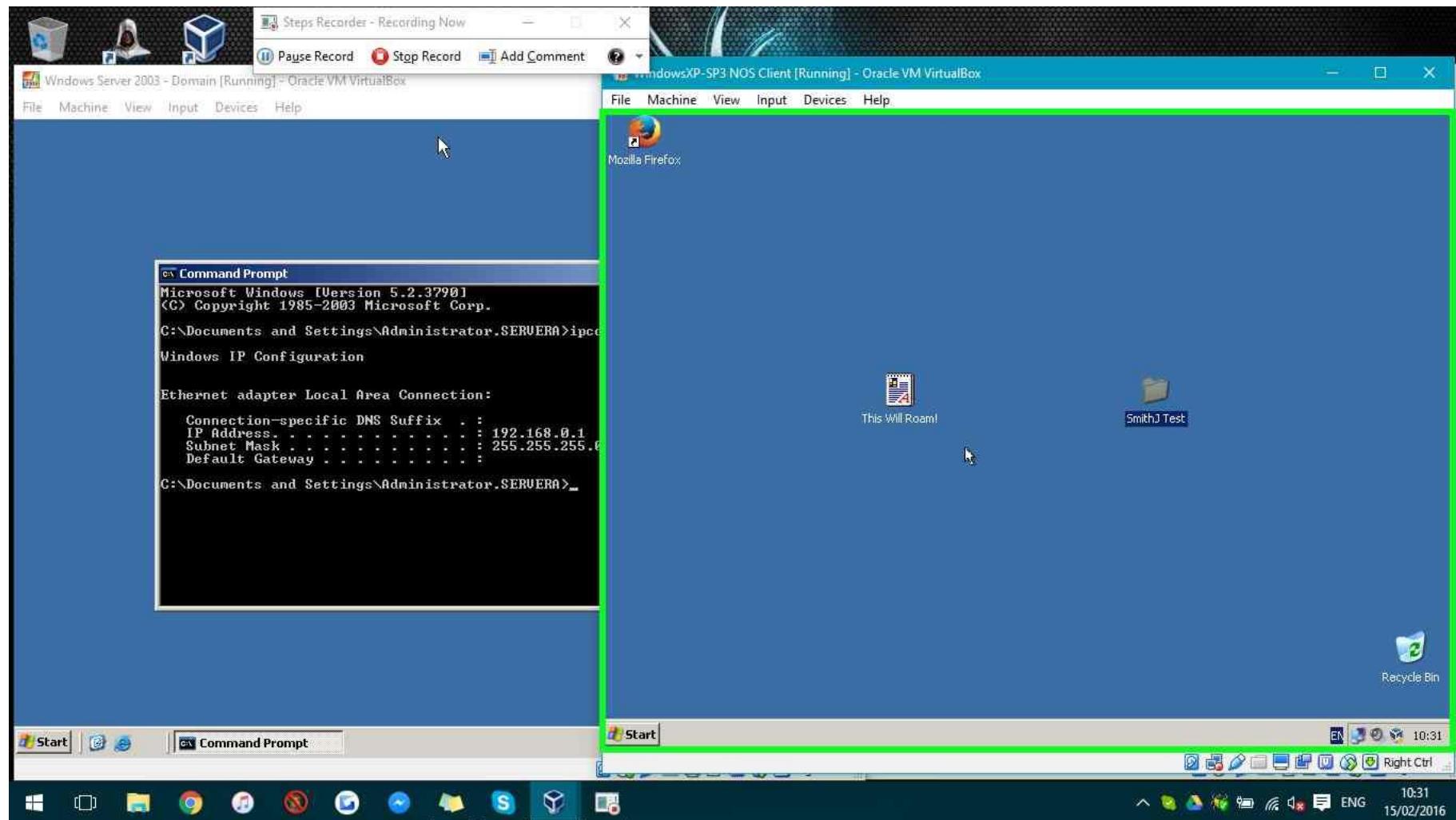
**Step 72: (15/02/2016 10:31:37)** User keyboard input on "WindowsXP-SP3 NOS Client [Running] - Oracle VM VirtualBox (window)" in "WindowsXP-SP3 NOS Client [Running] - Oracle VM VirtualBox" [CAPSLOCK CAPSLOCK CAPSLOCK ... SHIFT-SHIFT]

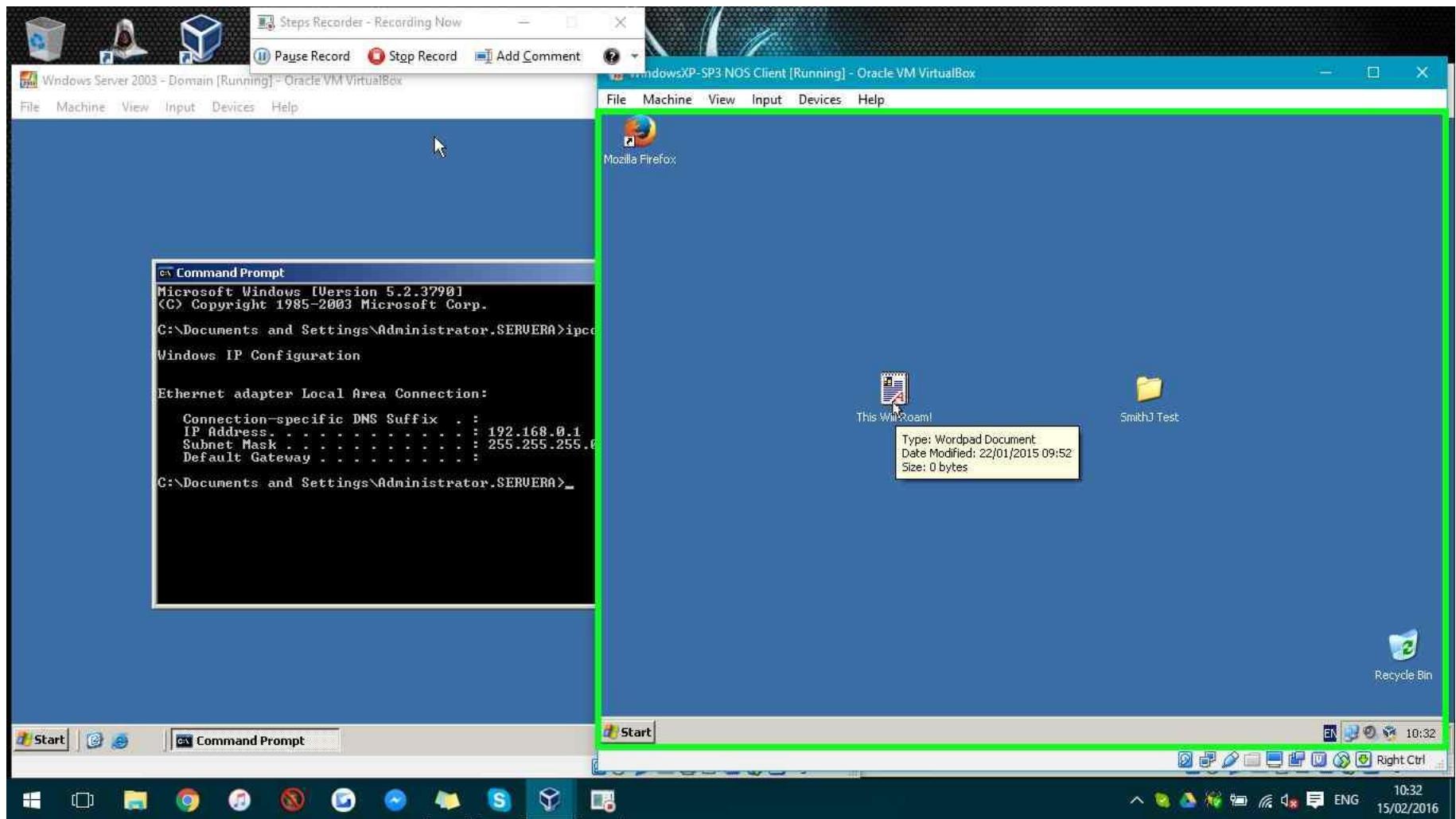
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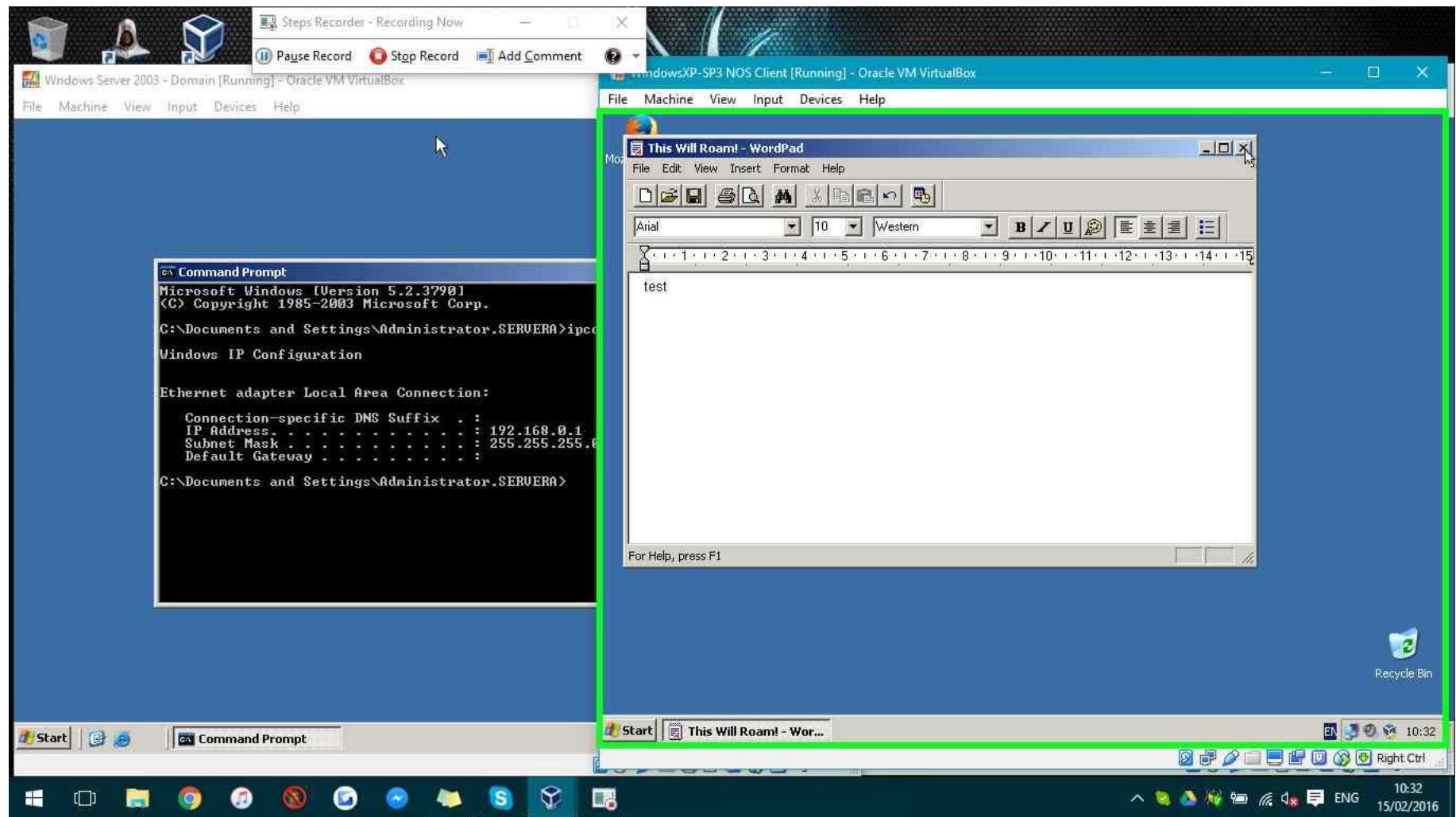
**Step 73: (15/02/2016 10:31:41)** User left click on "qt\_scrollarea\_viewport (pane)" in "WindowsXP-SP3 NOS Client [Running] - Oracle VM VirtualBox"

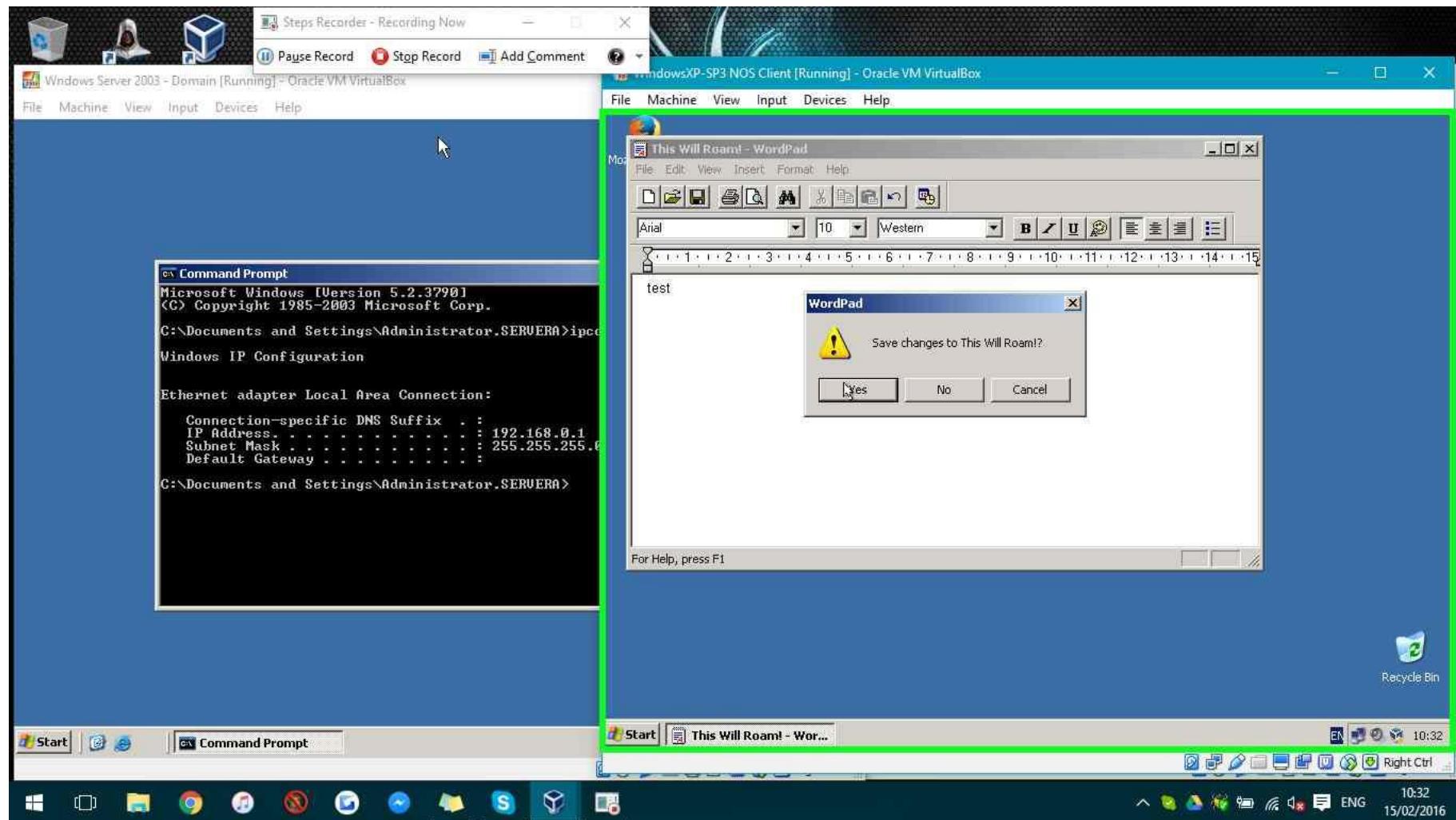


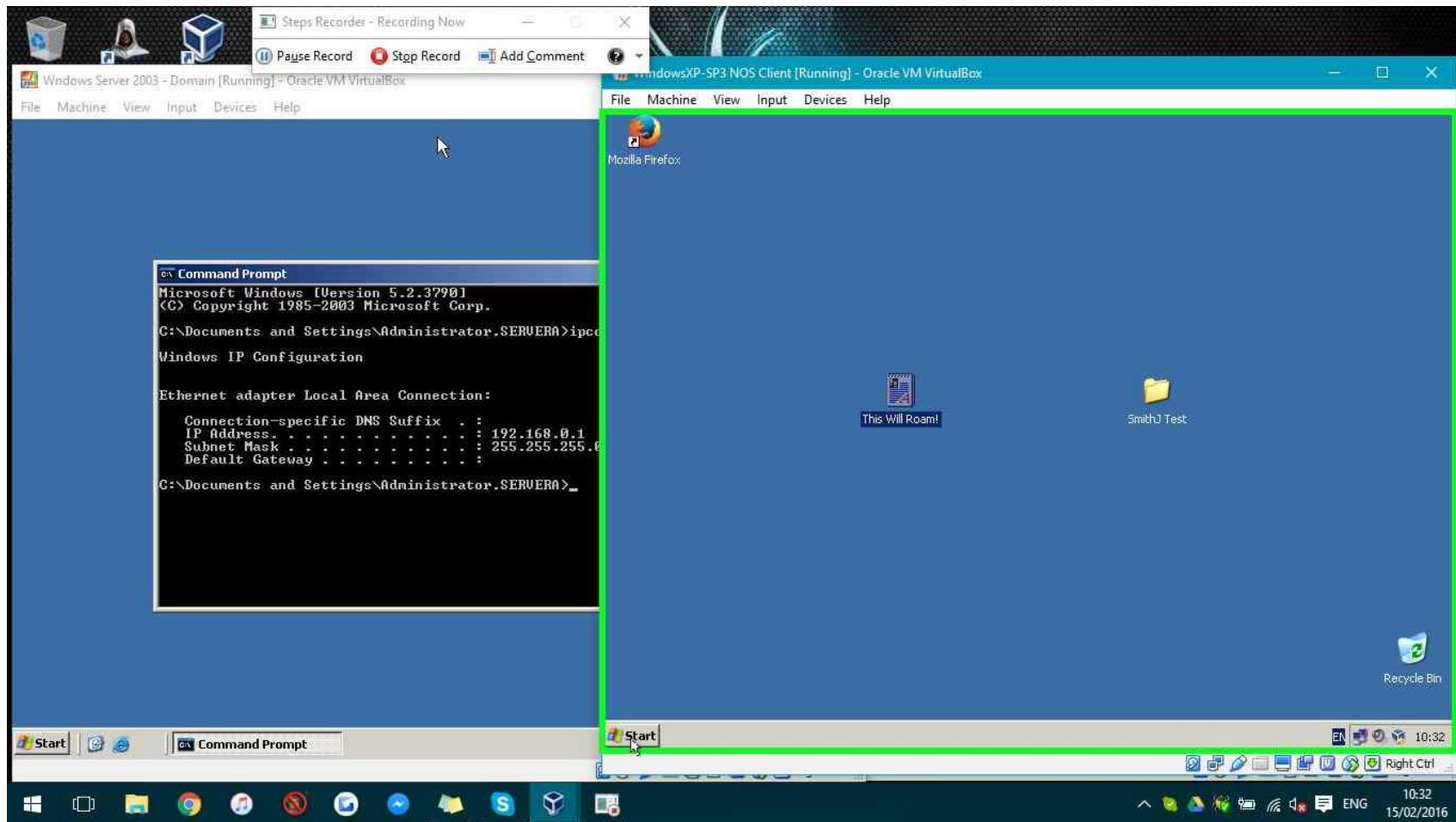


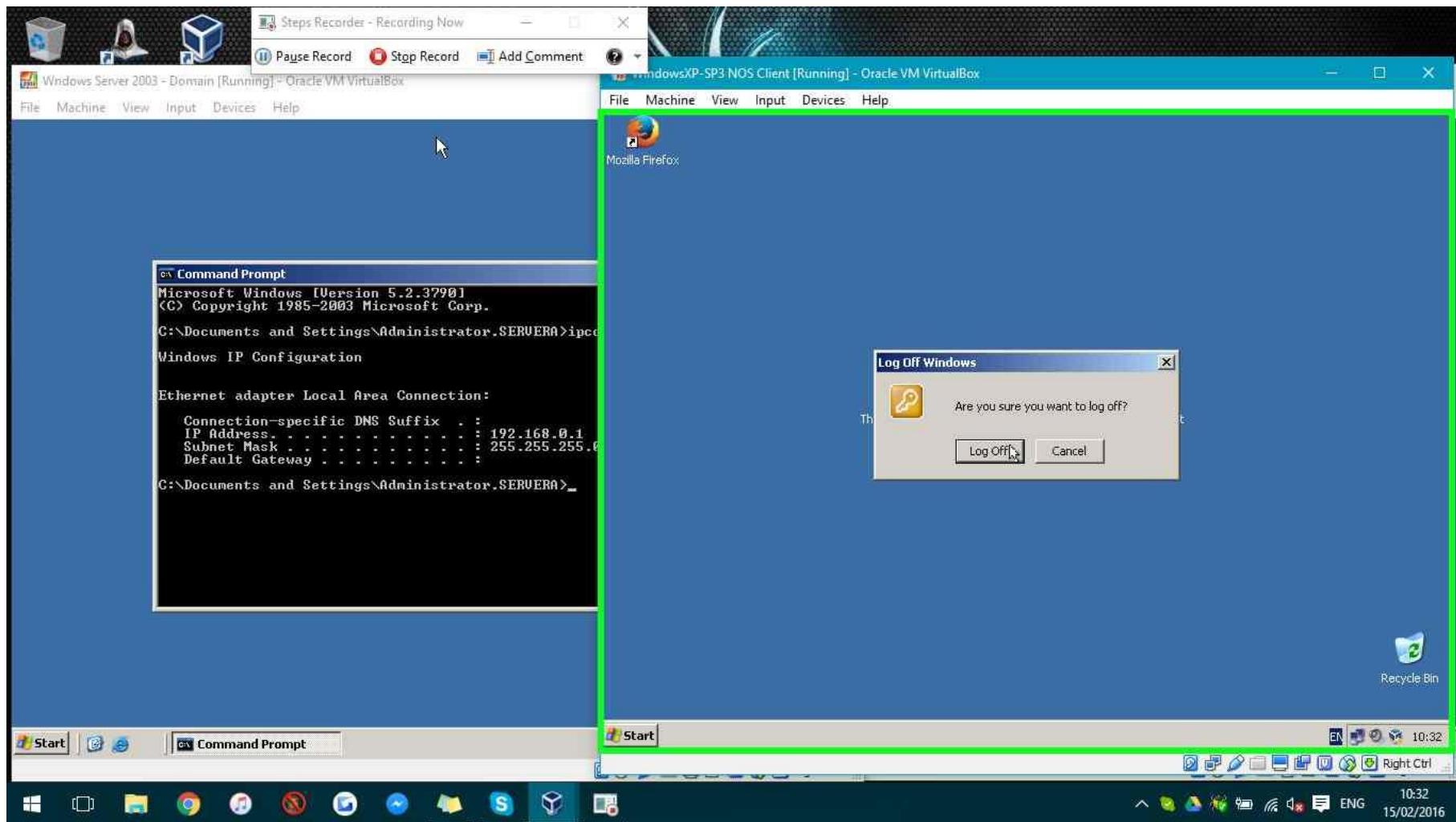






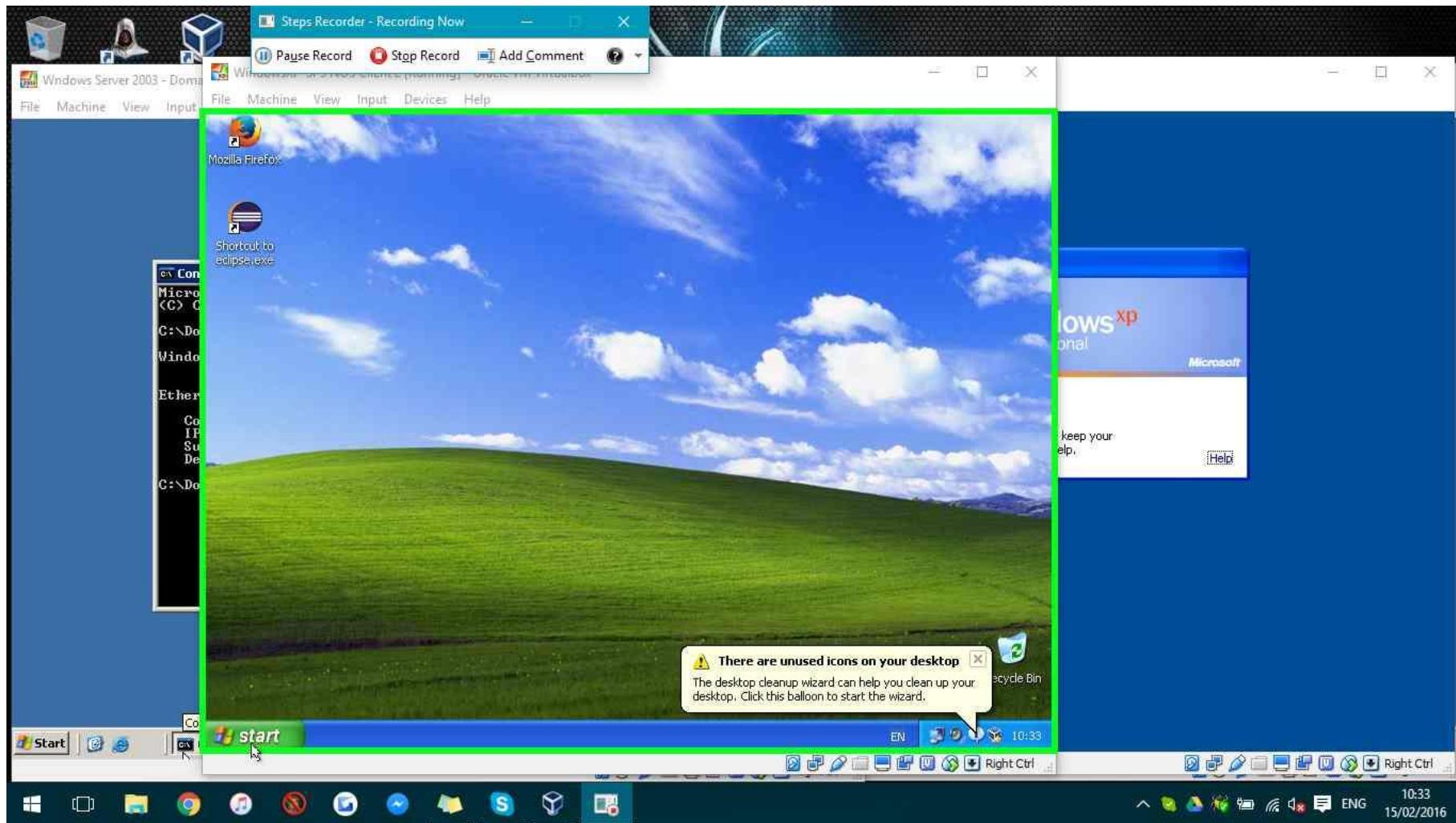


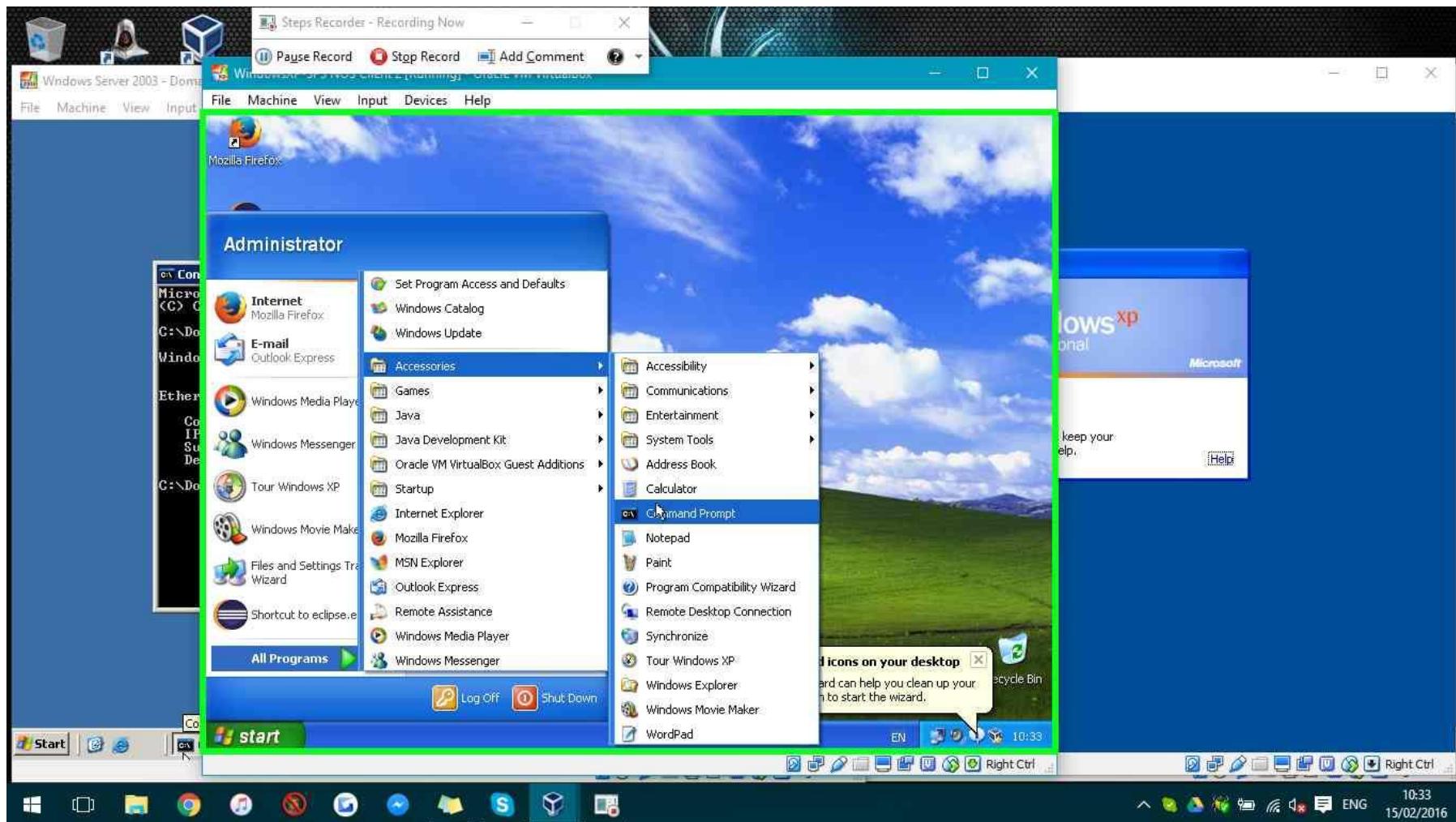


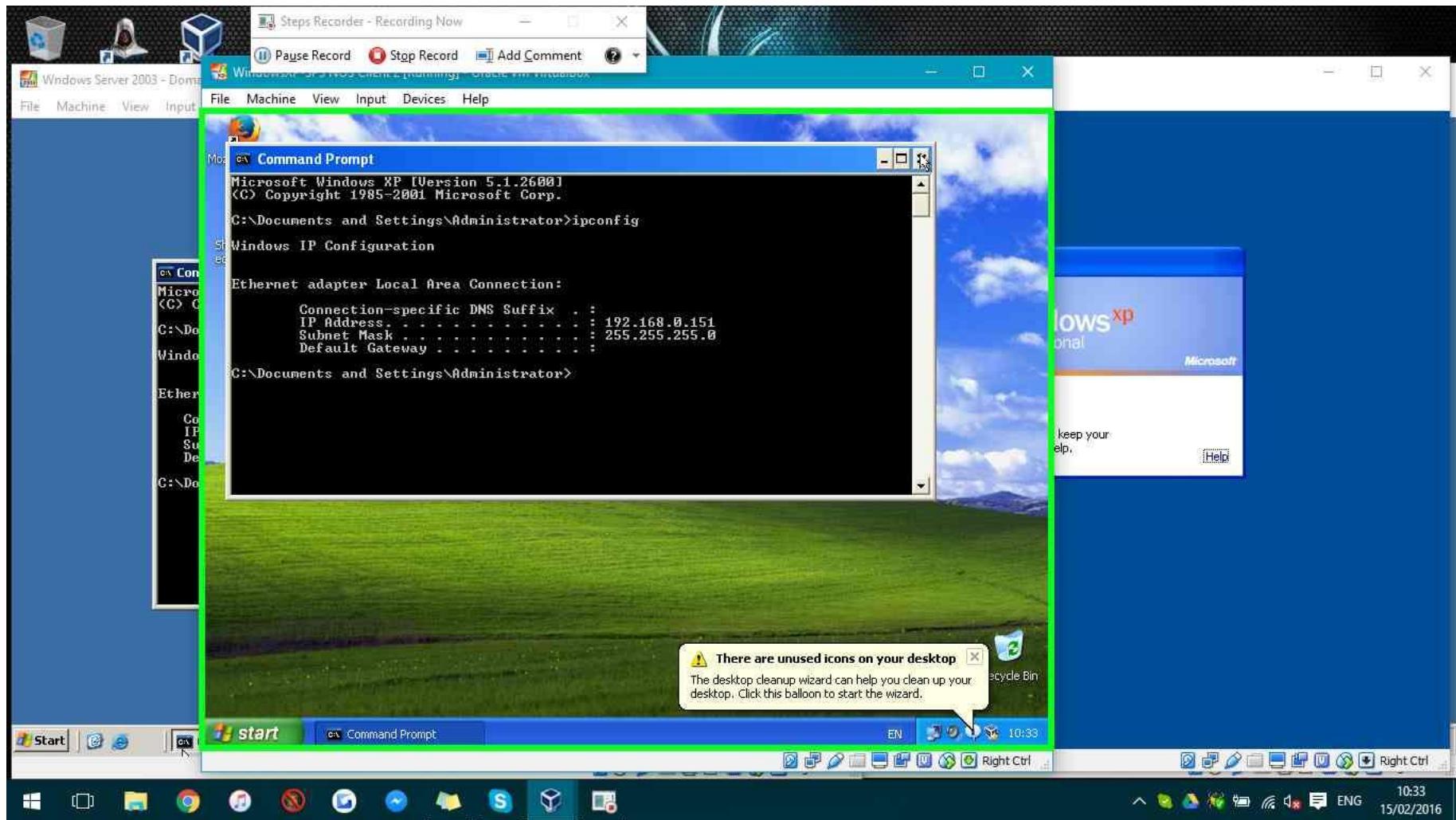


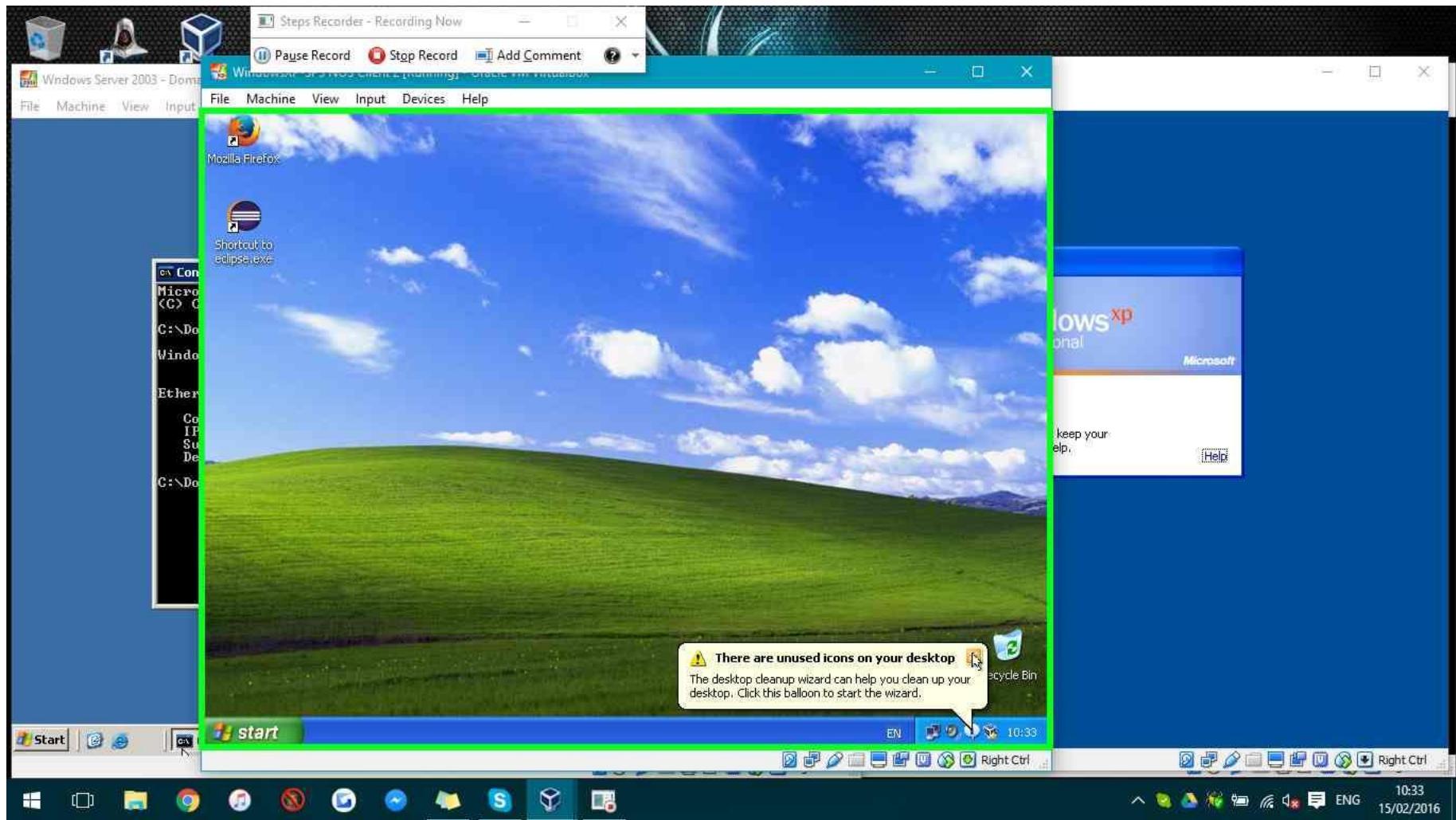
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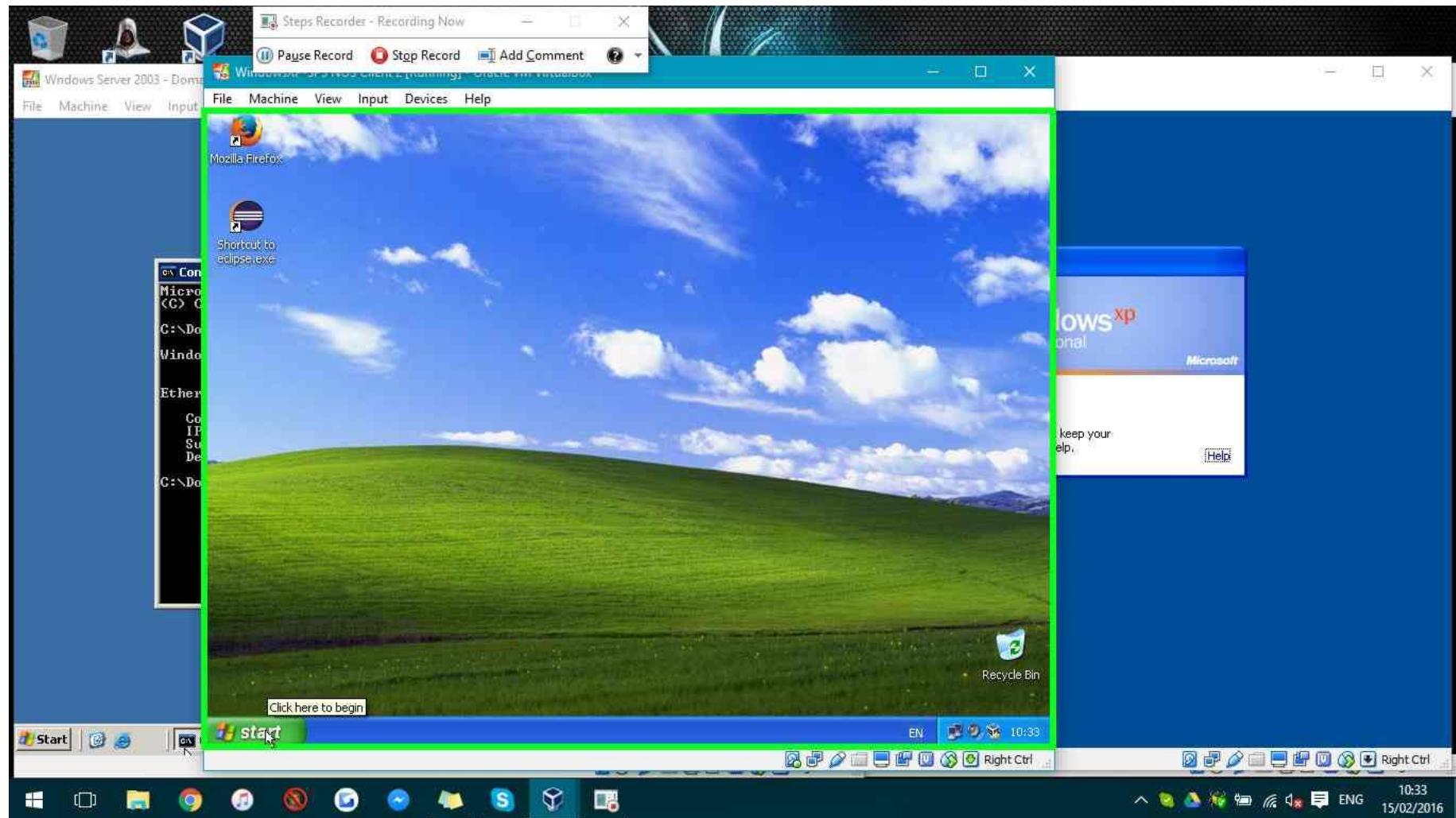
**Step 86: (15/02/2016 10:33:32)** User left click on "qt\_scrollarea\_viewport (pane)" in "WindowsXP-SP3 NOS Client 2 [Running] - Oracle VM VirtualBox"

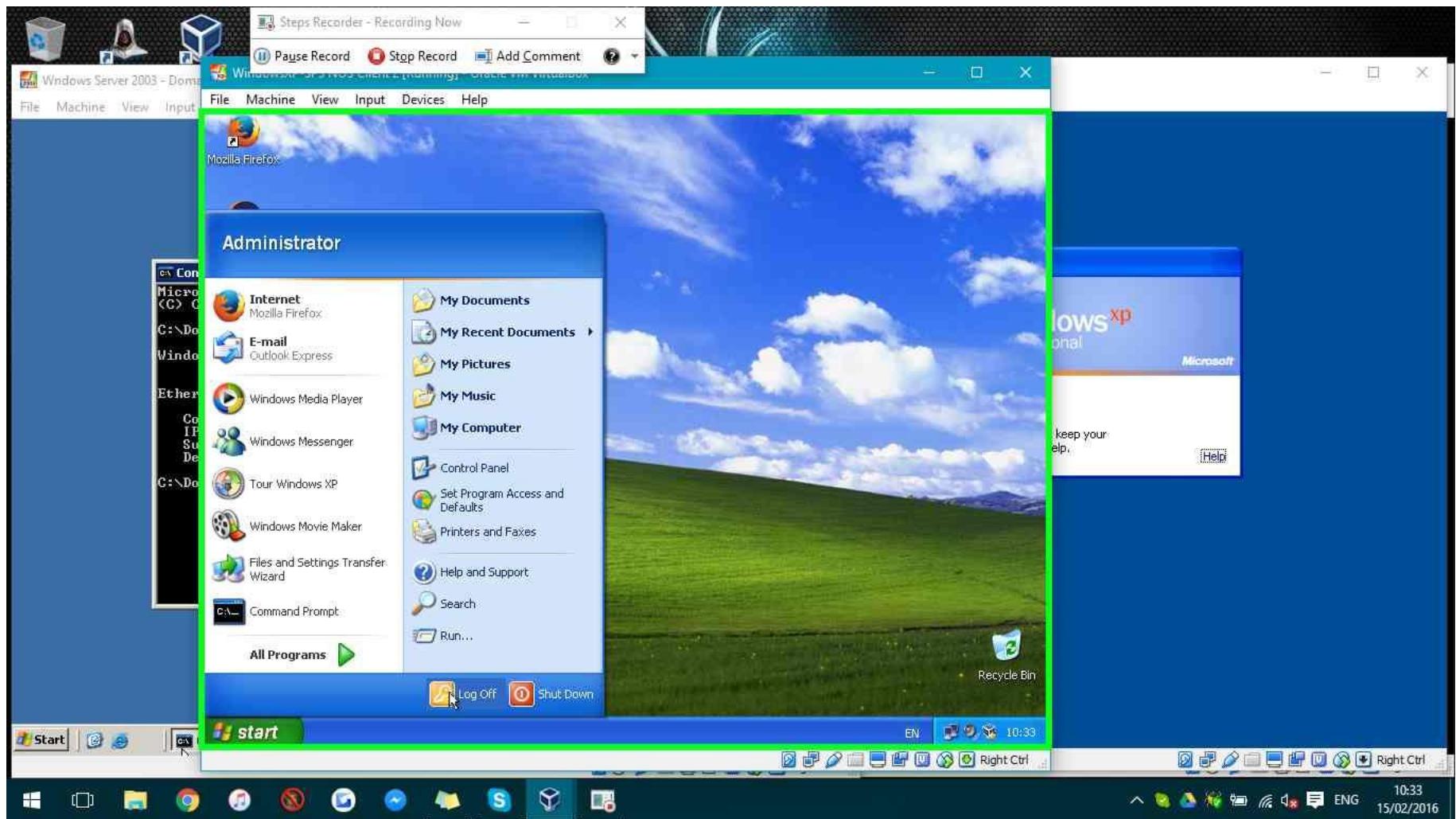






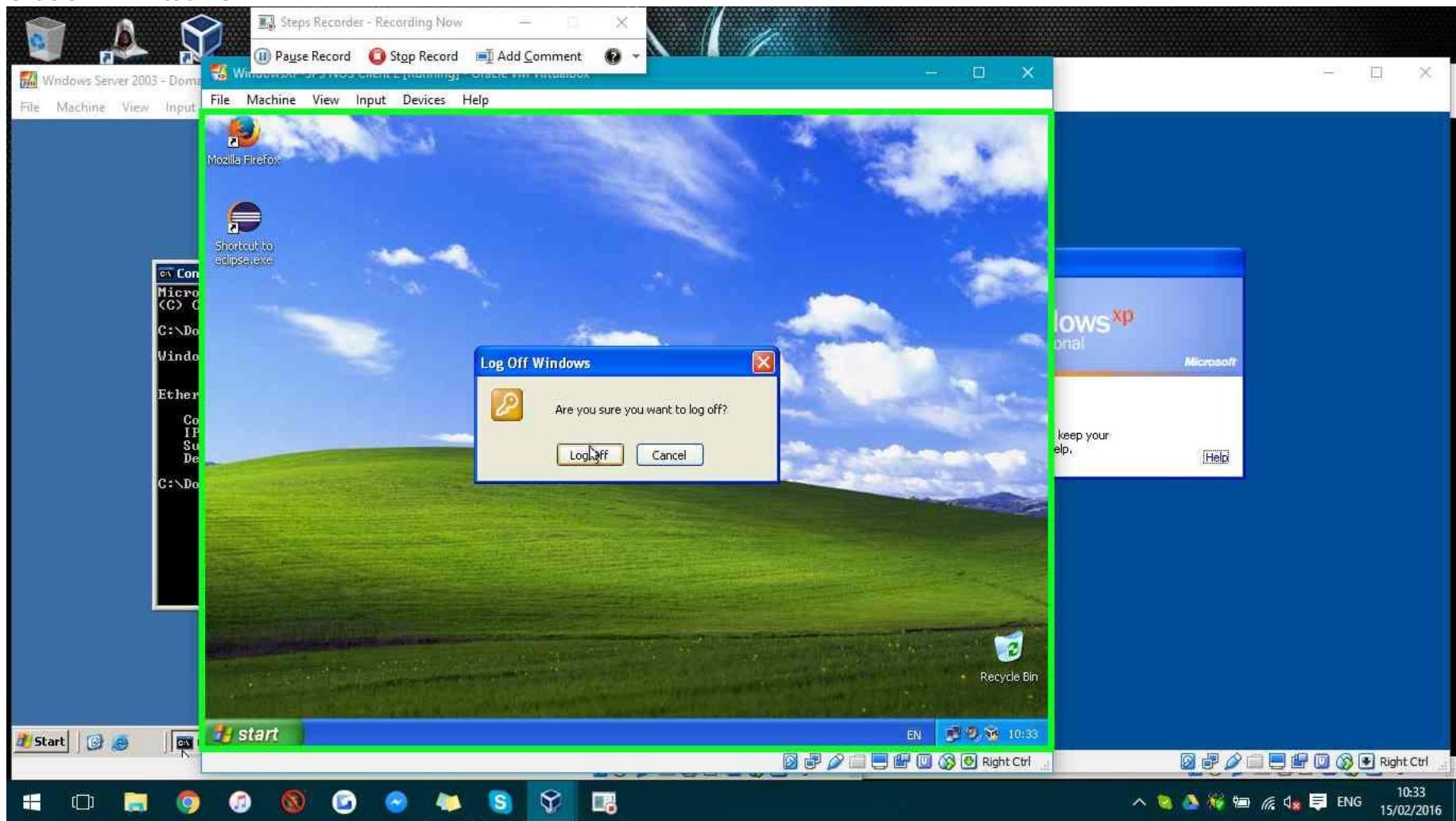






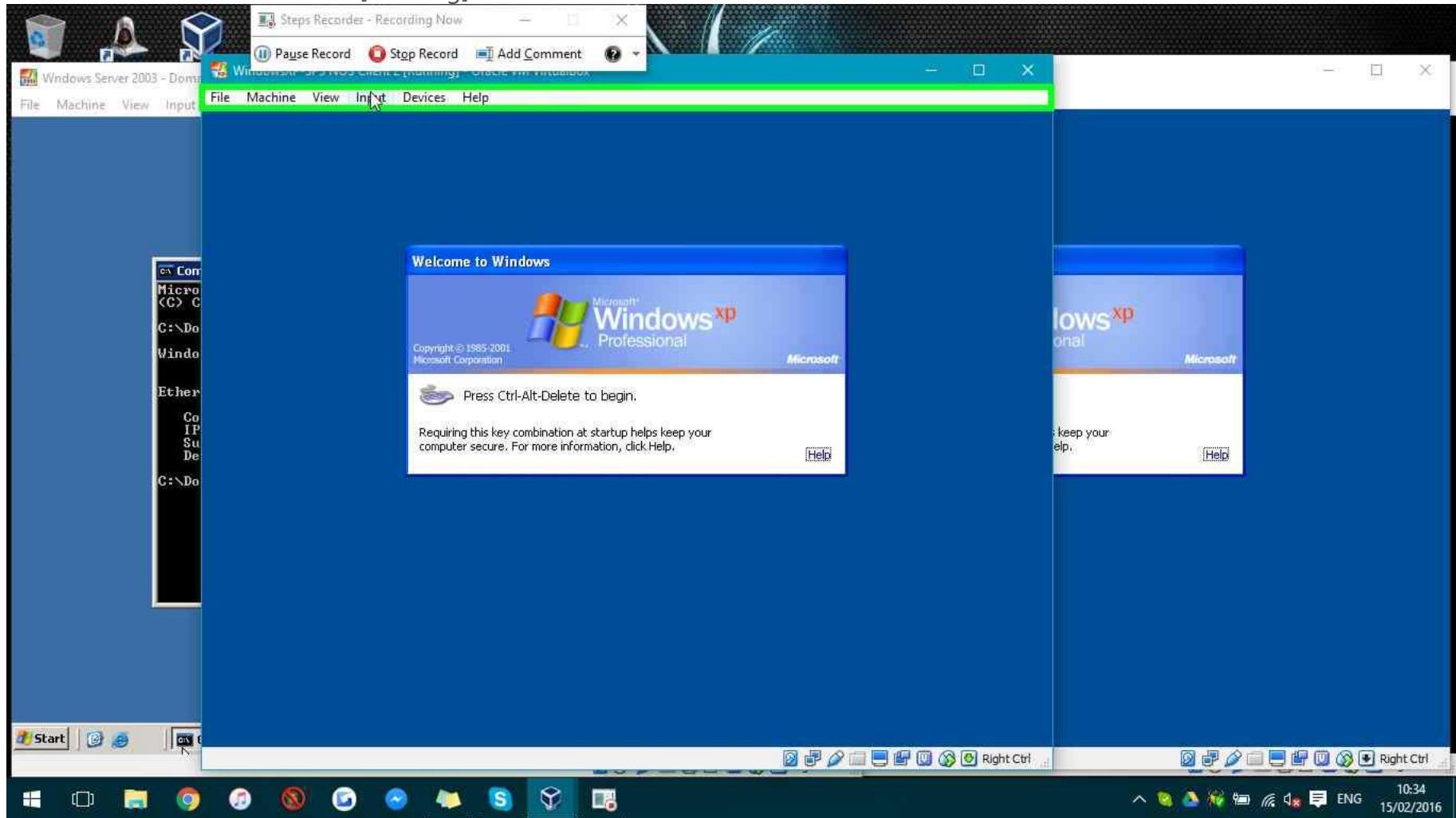
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**Step 92: (15/02/2016 10:33:57) User left click on "qt\_scrollarea\_viewport (pane)" in "WindowsXP-SP3 NOS Client 2 [Running] - Oracle VM VirtualBox"**

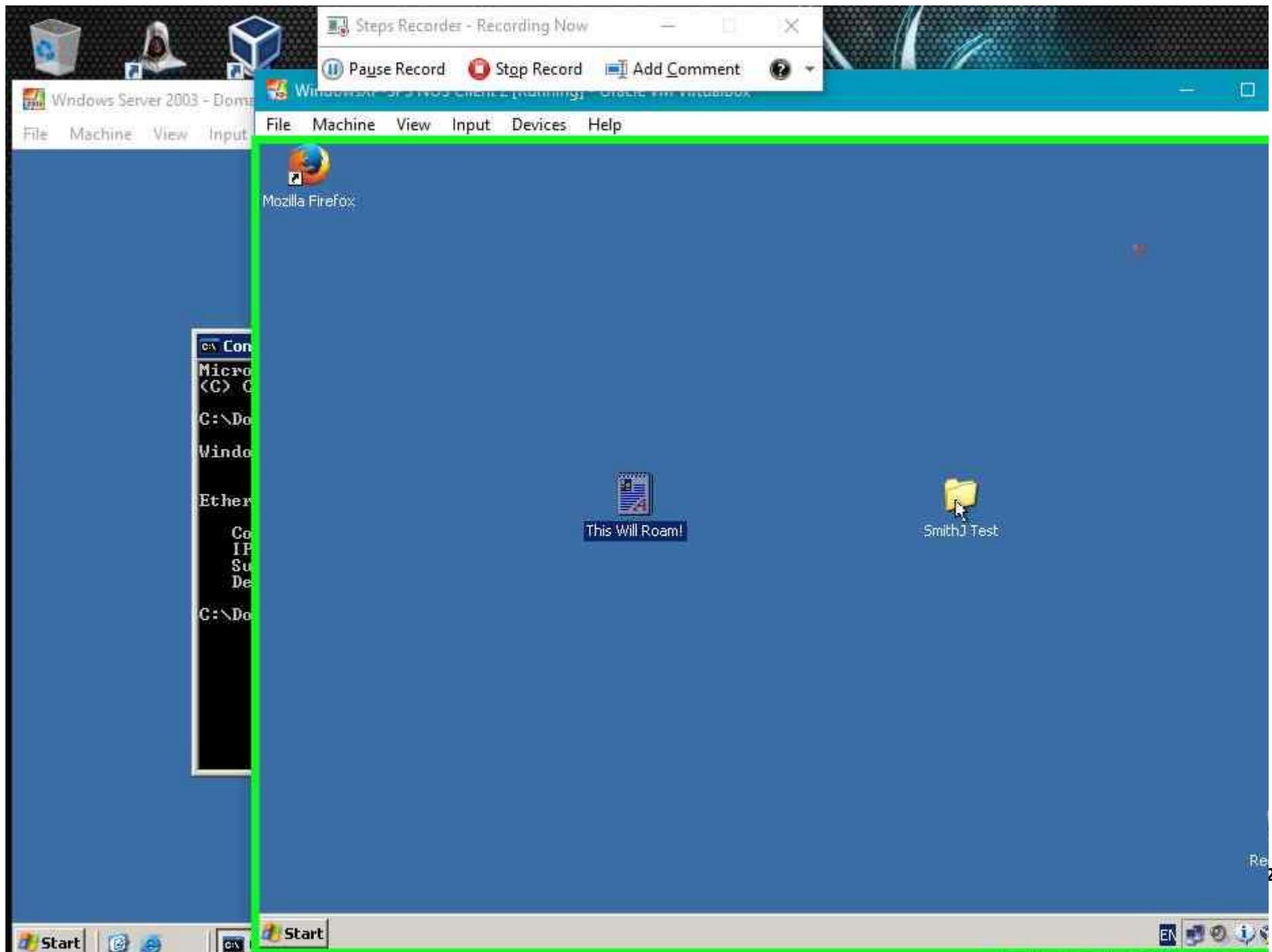


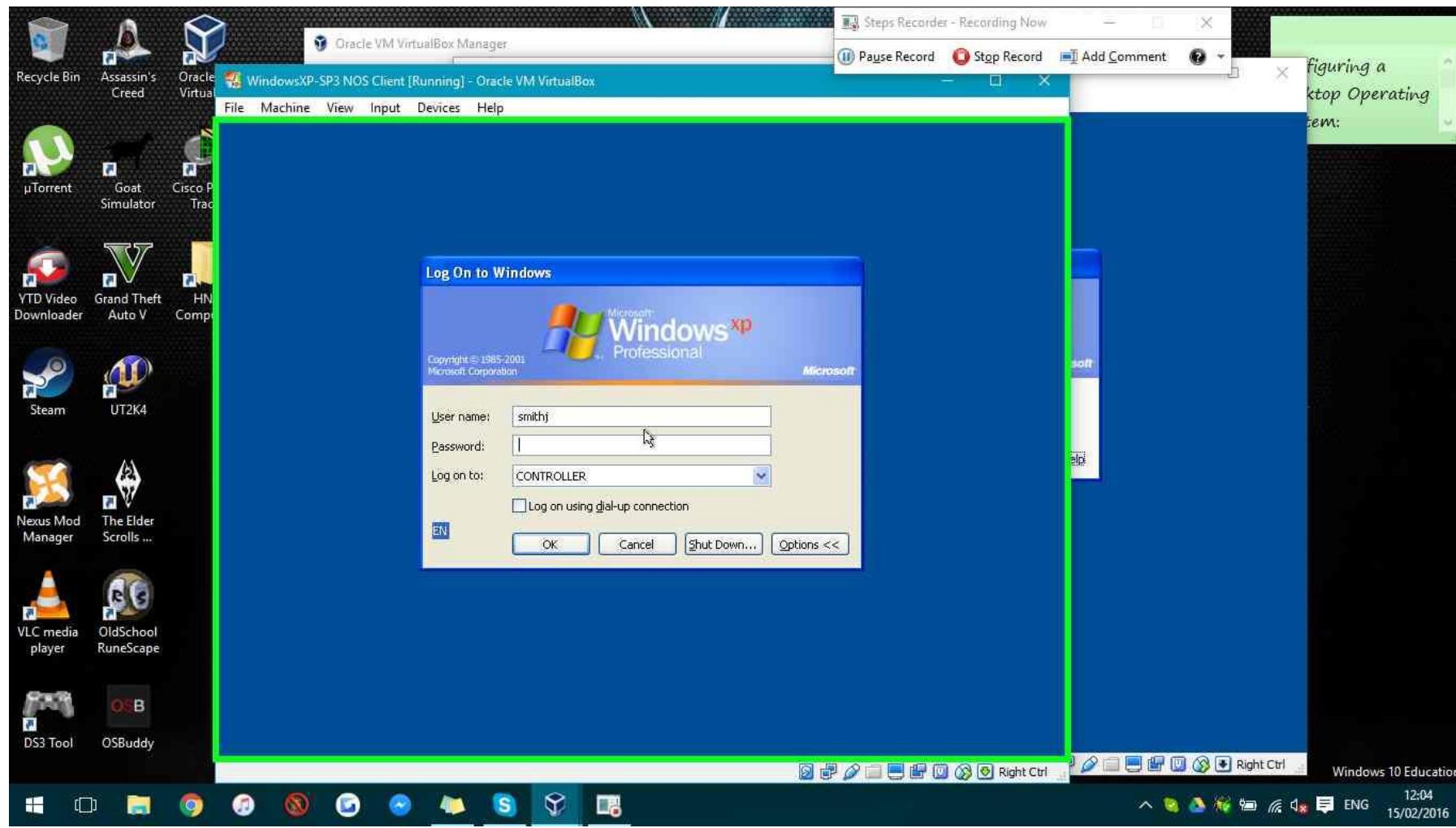
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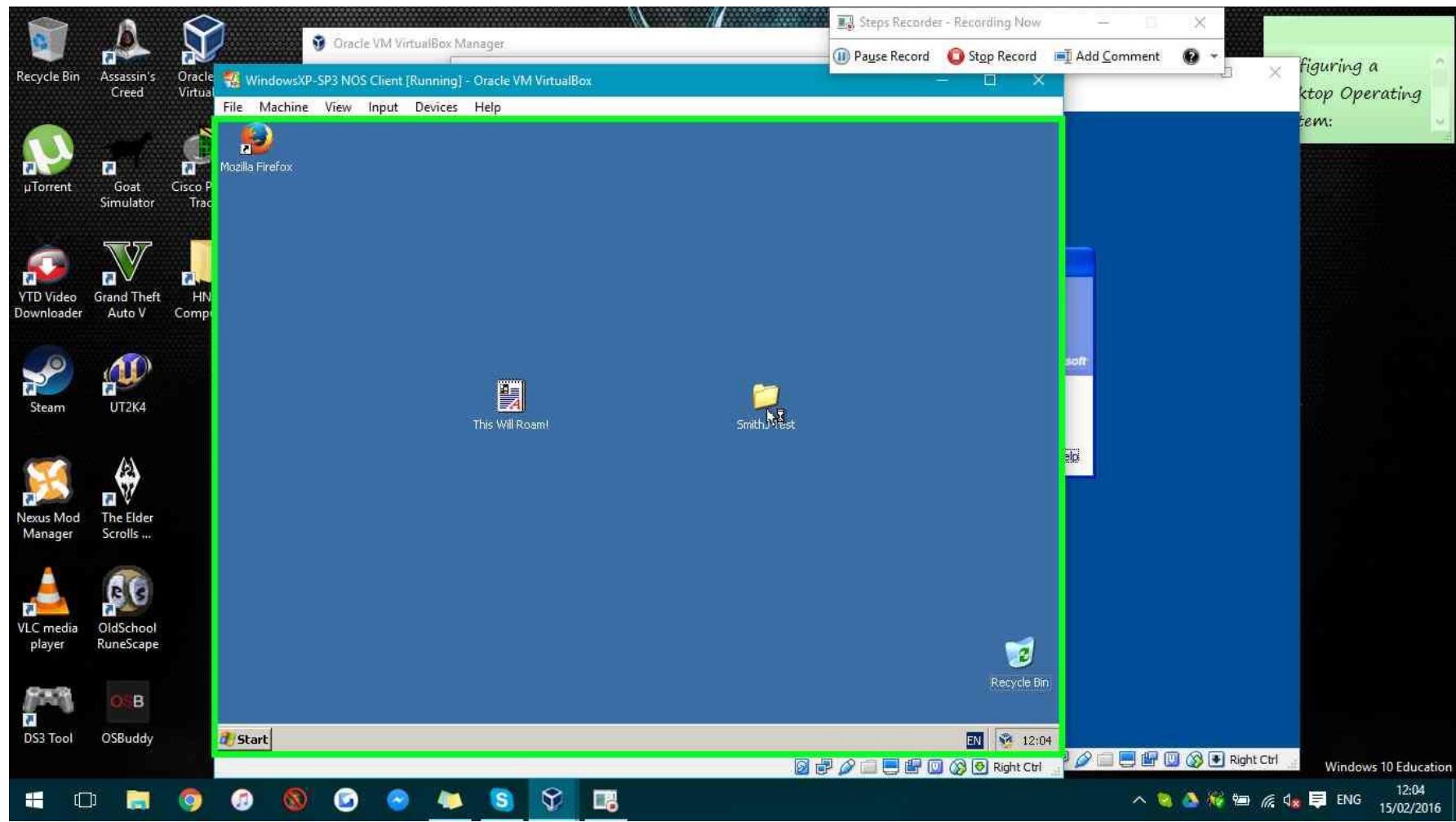
**Step 93: (15/02/2016 10:34:03)** User left click on "WindowsXP-SP3 NOS Client 2 [Running] - Oracle VM VirtualBox (window)" in "WindowsXP-SP3 NOS Client 2 [Running] - Oracle VM VirtualBox"

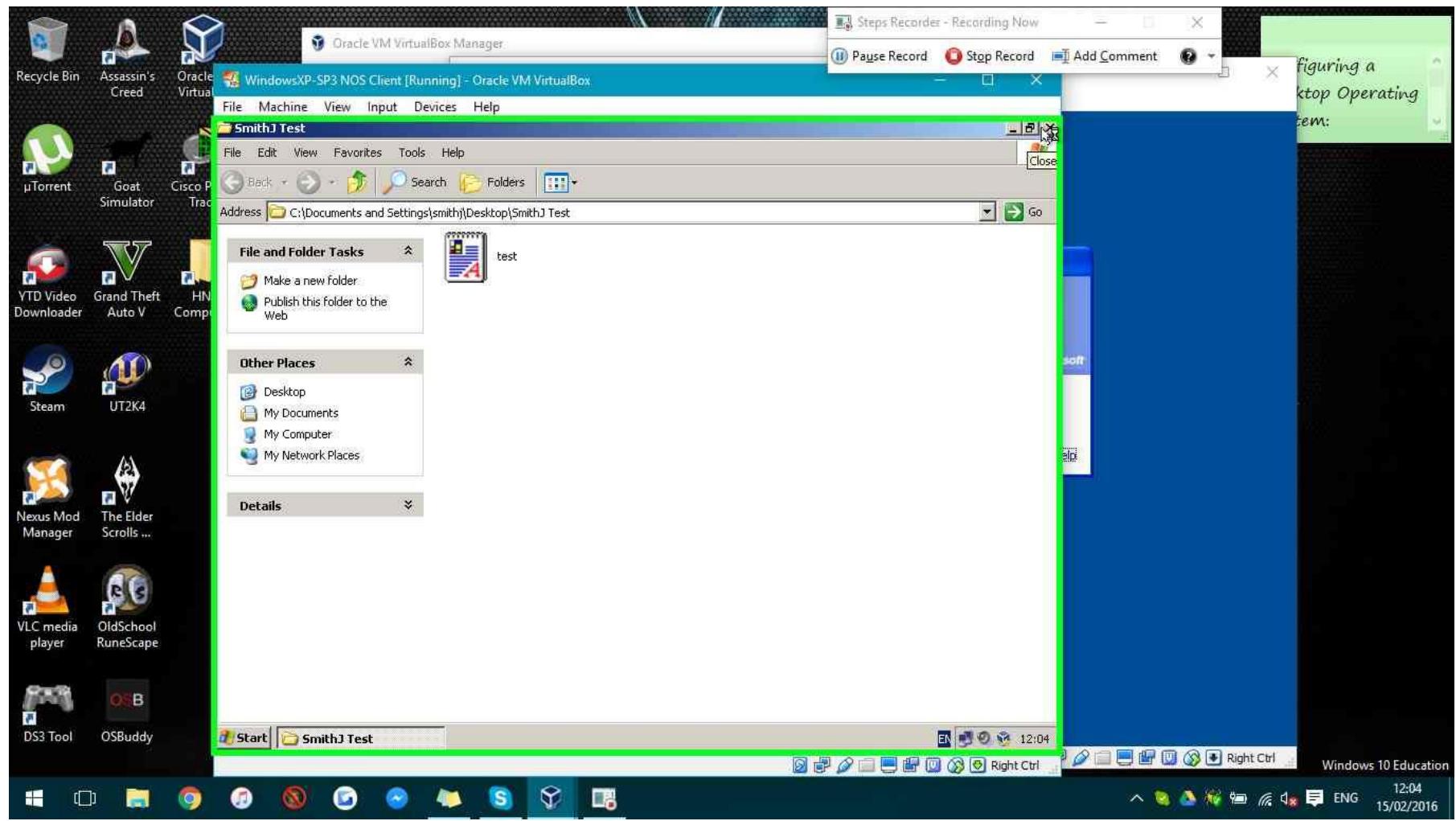


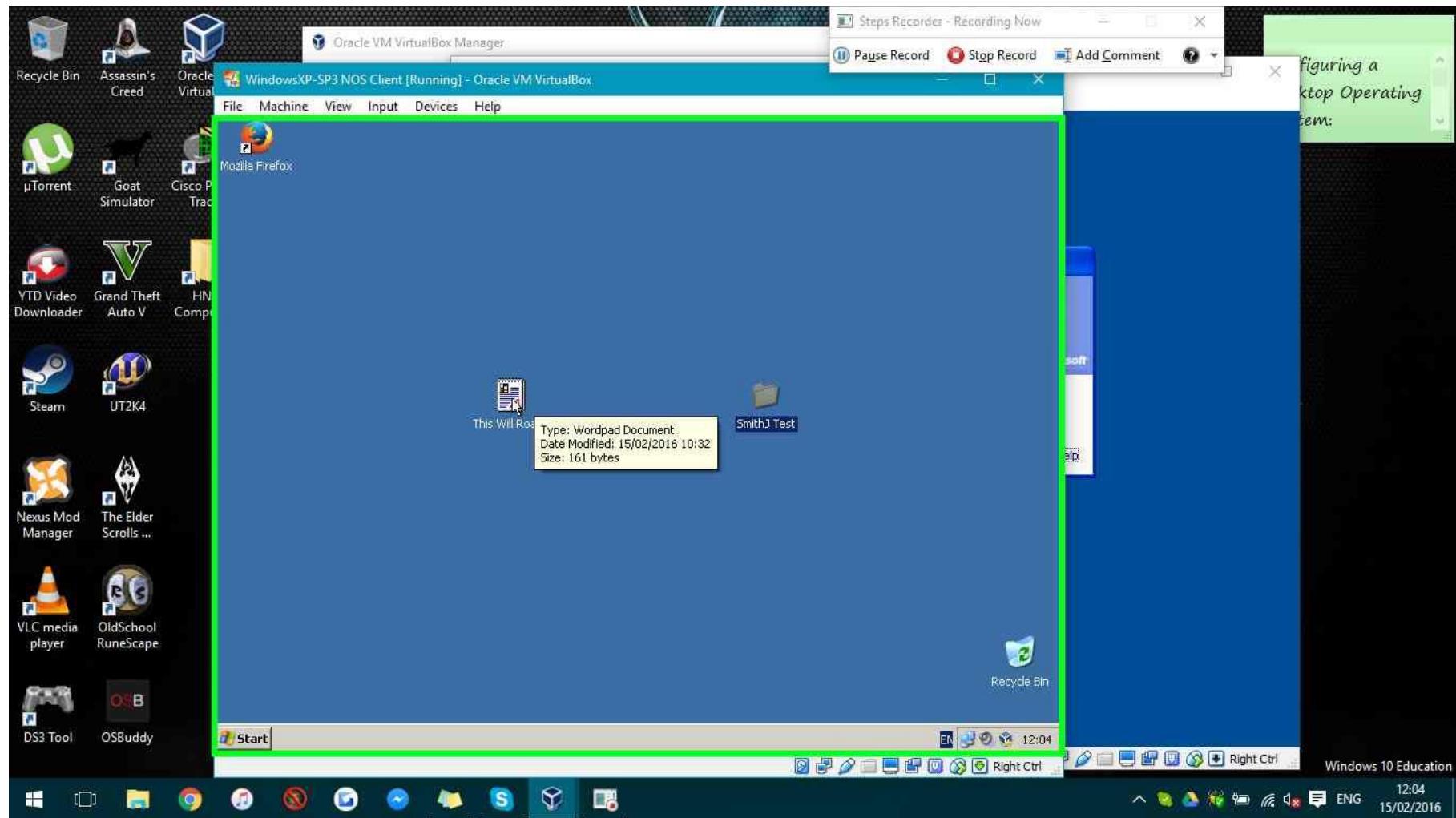


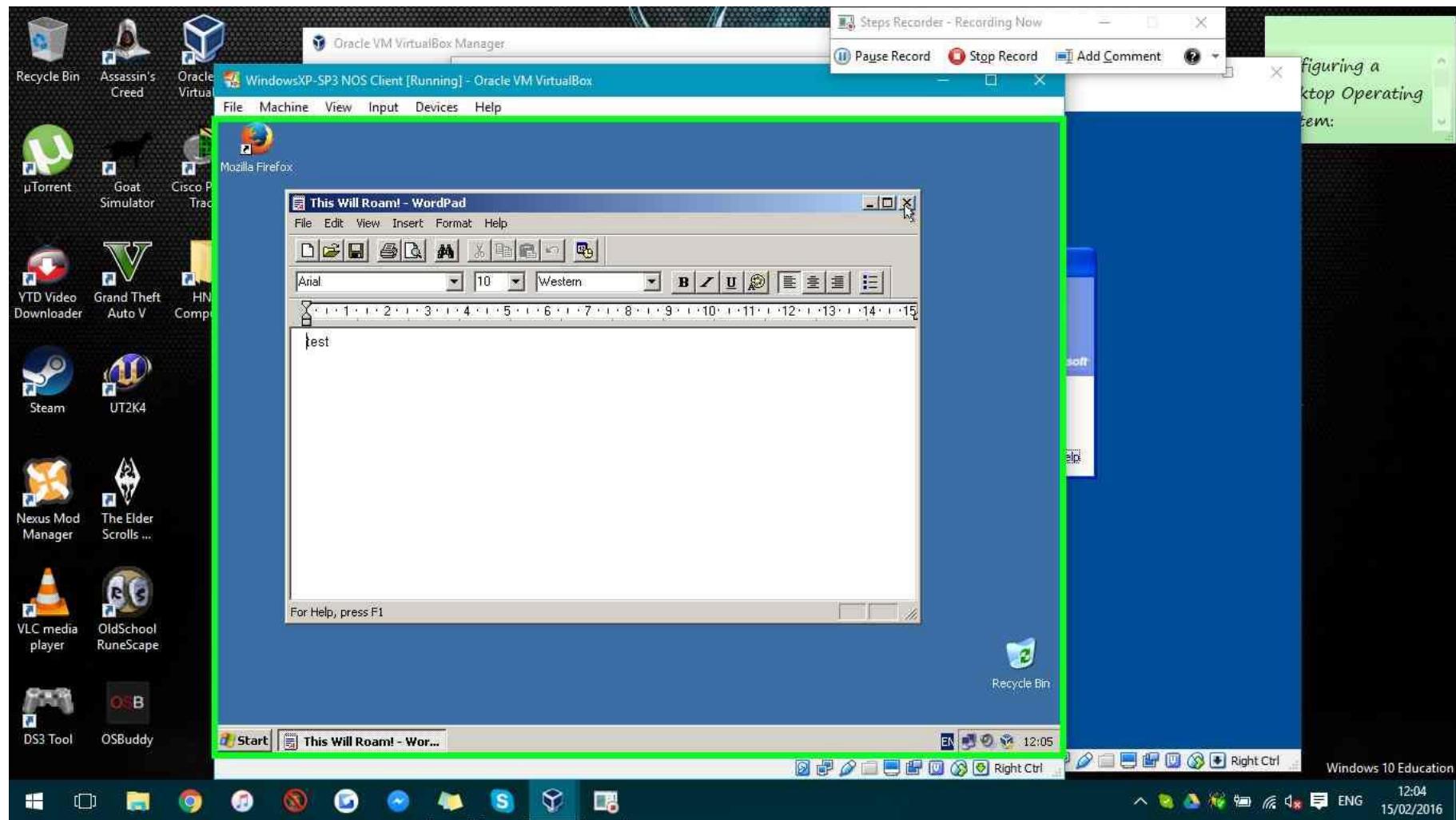




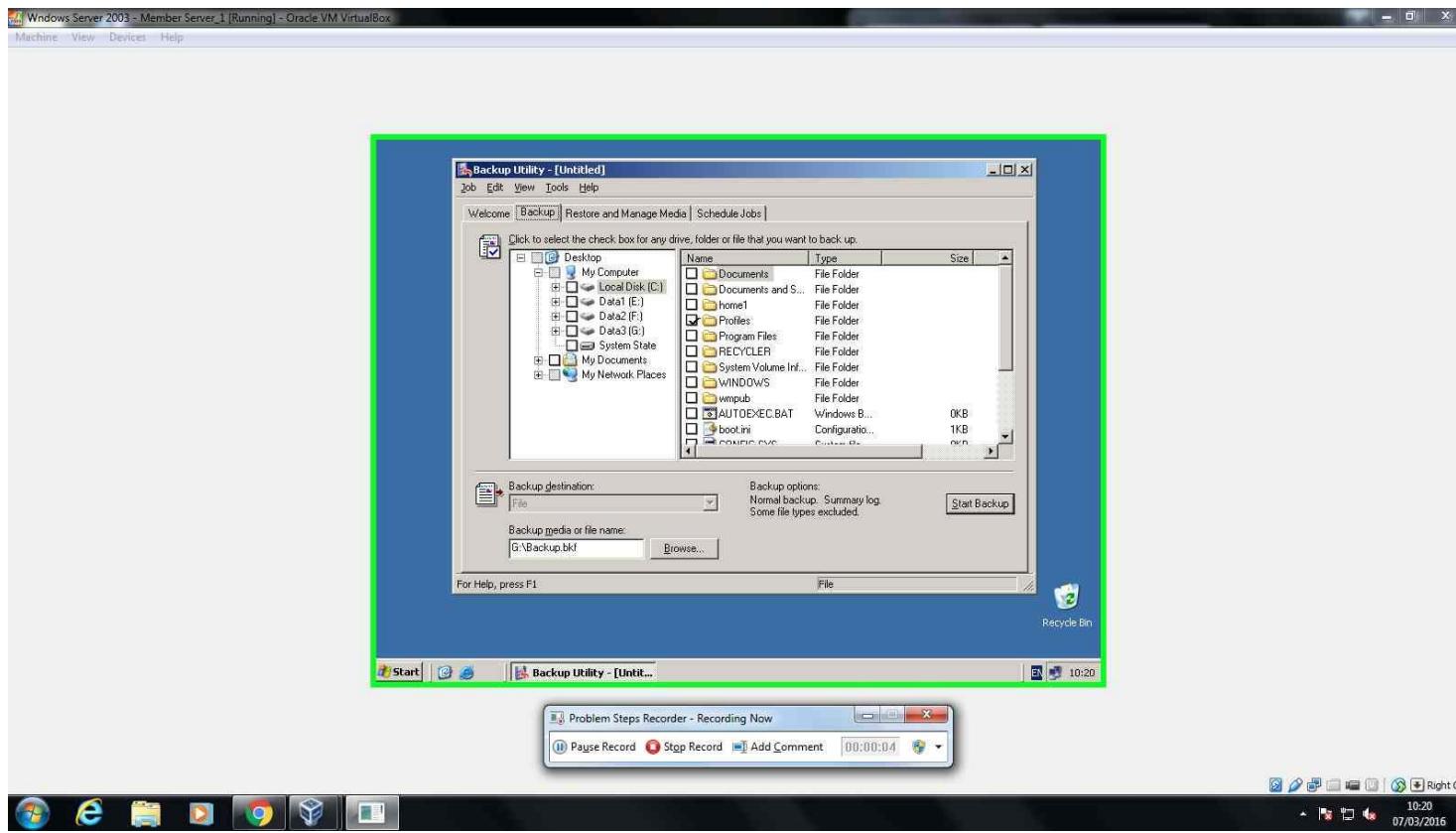


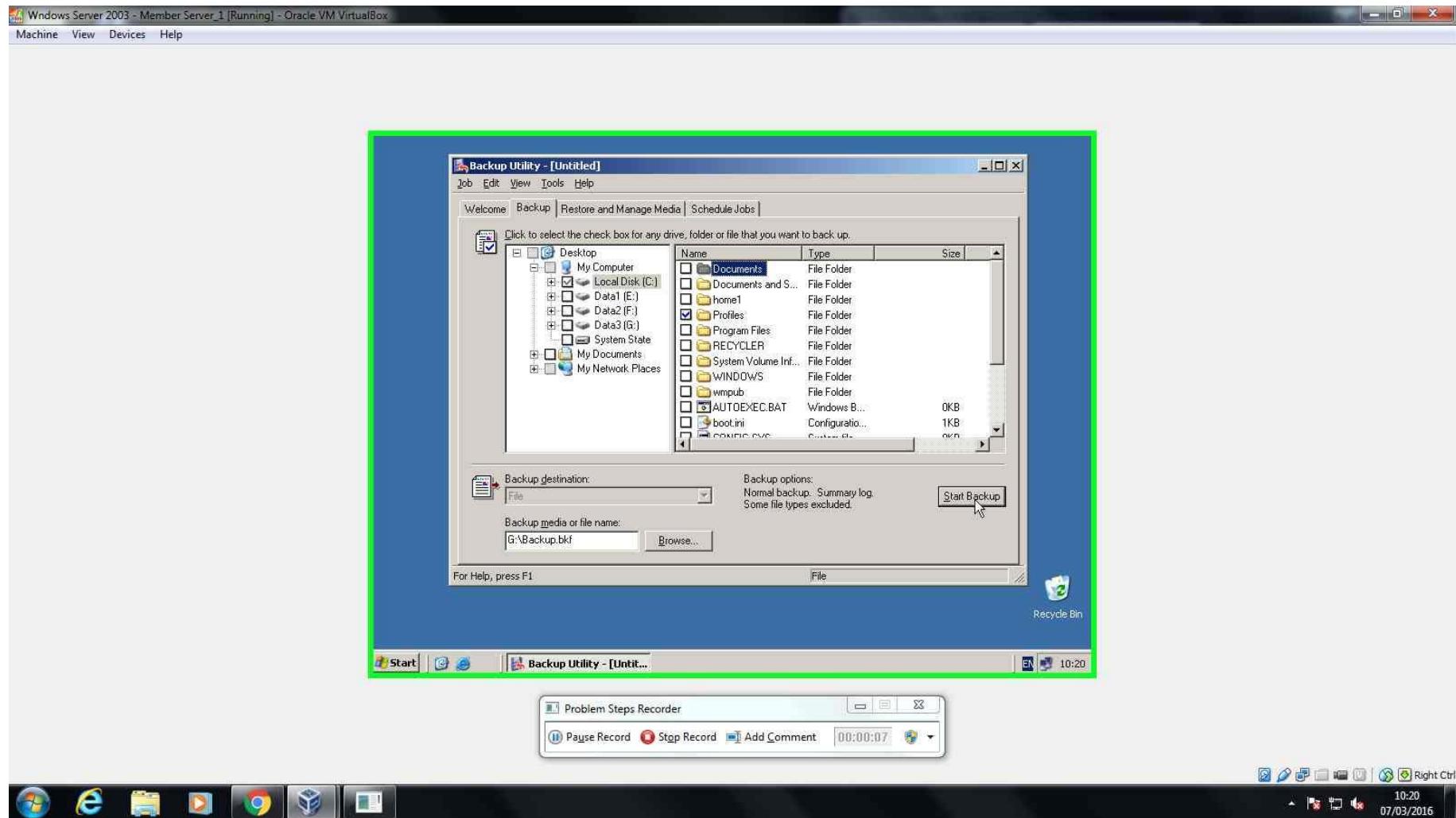


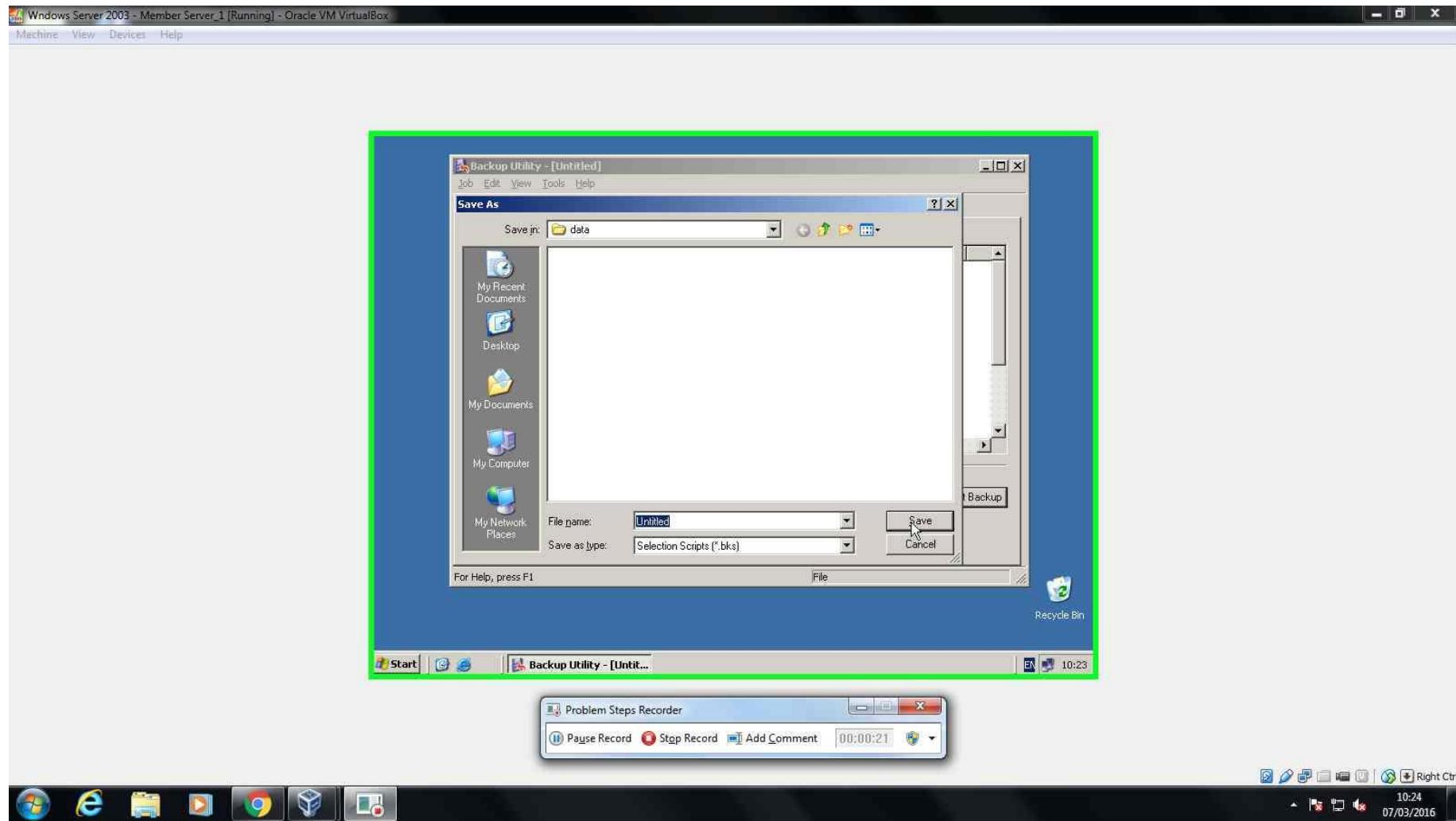


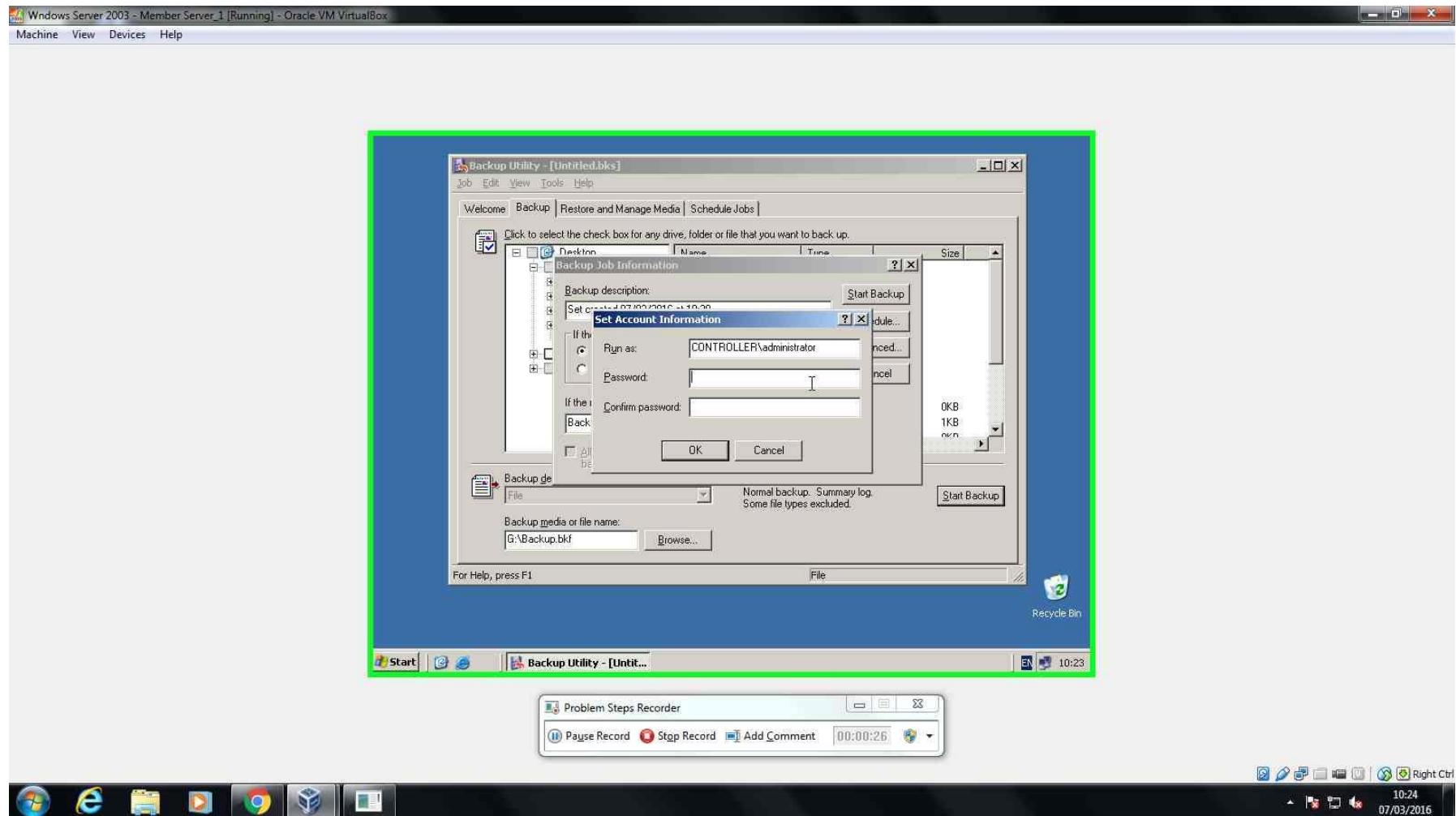


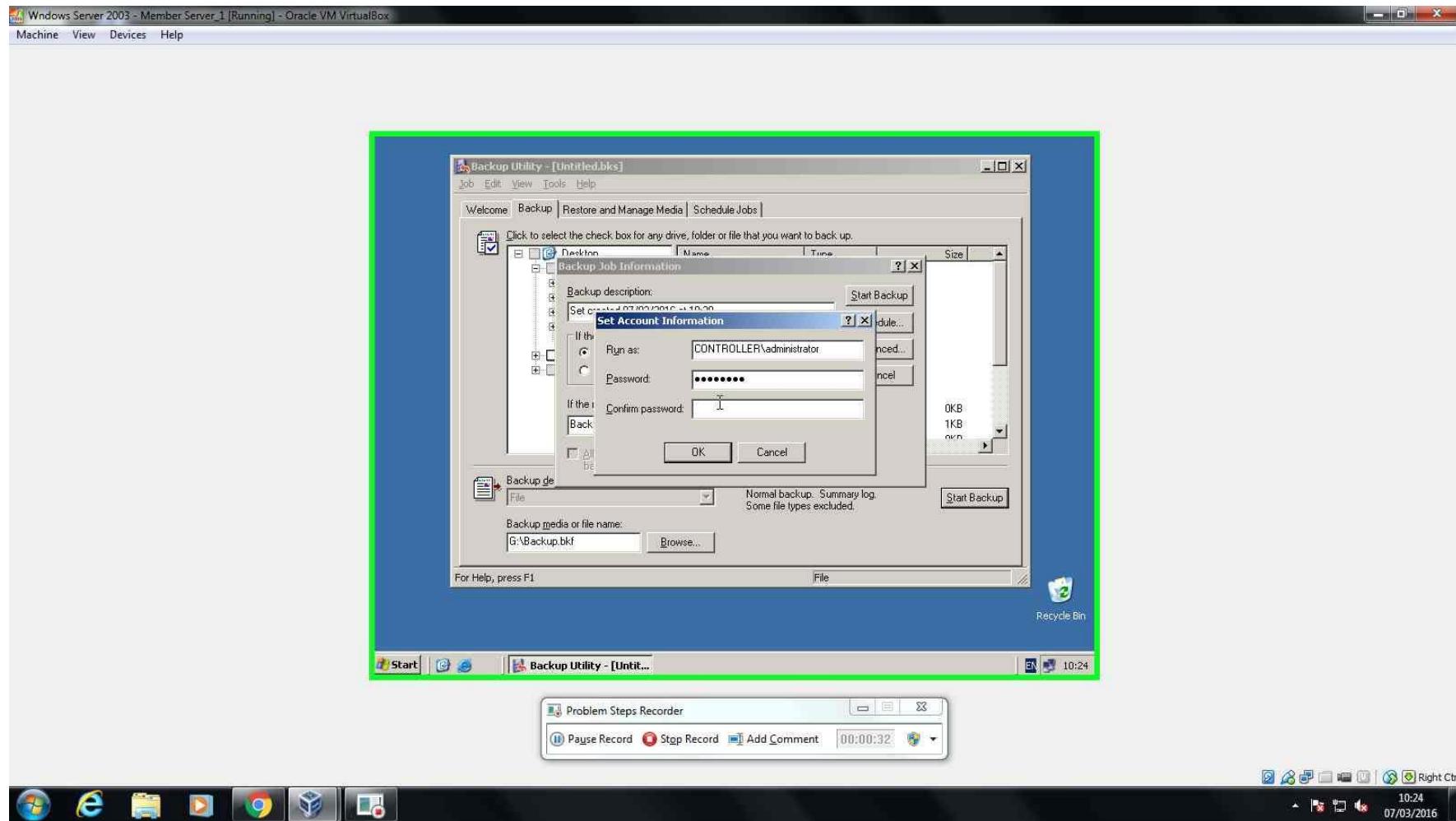
Appendix 138: Security - Backups PSR

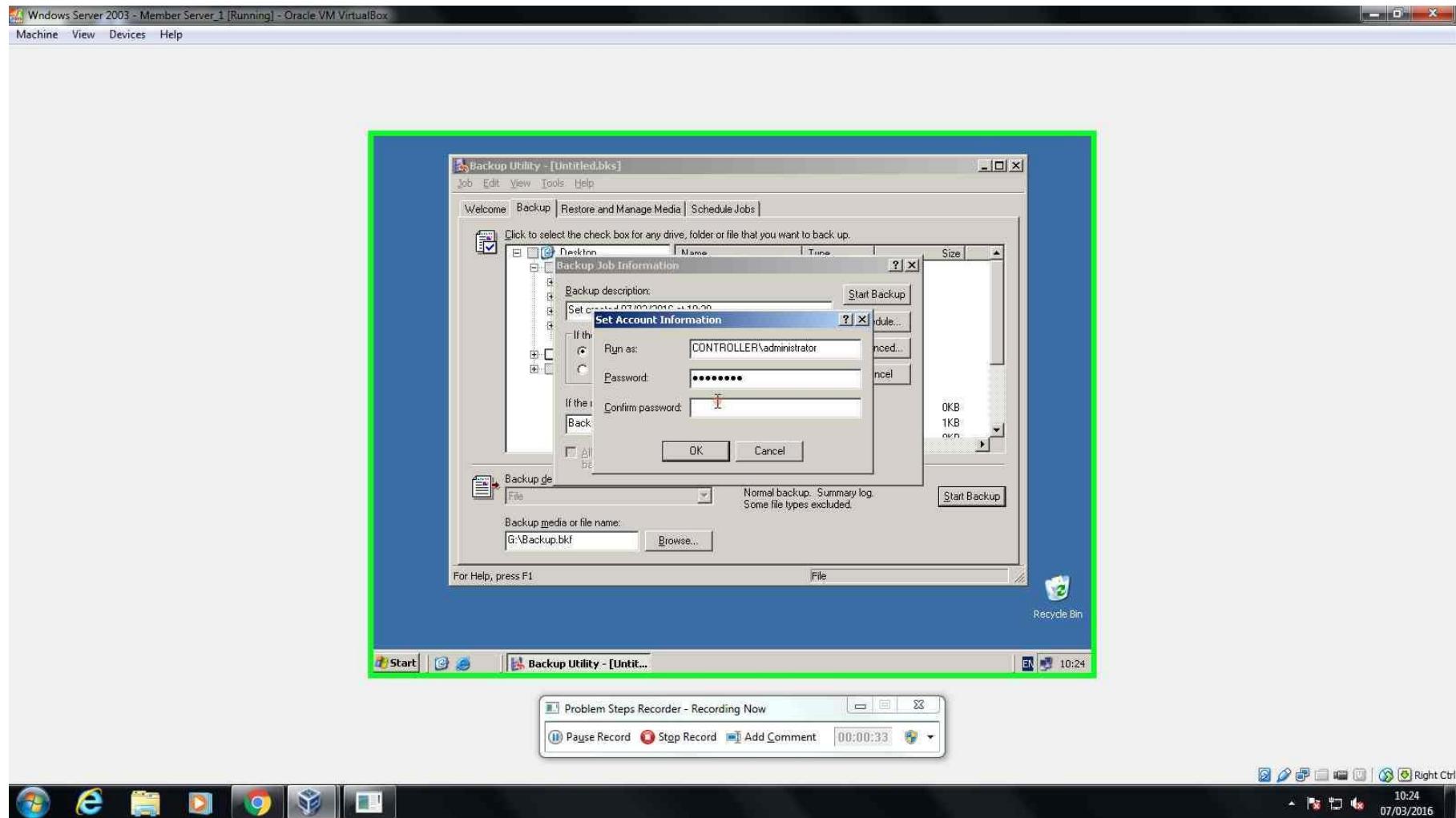


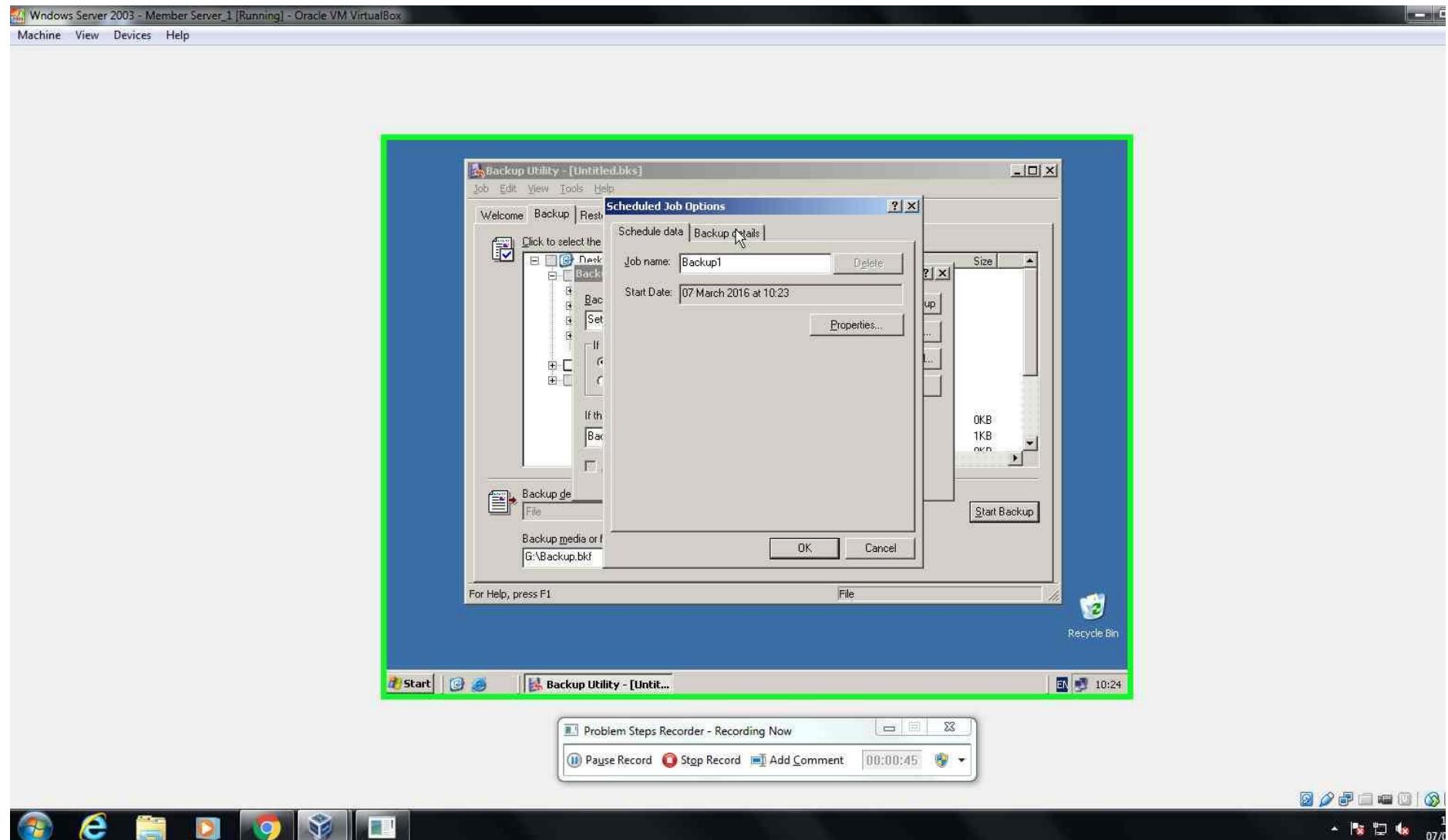


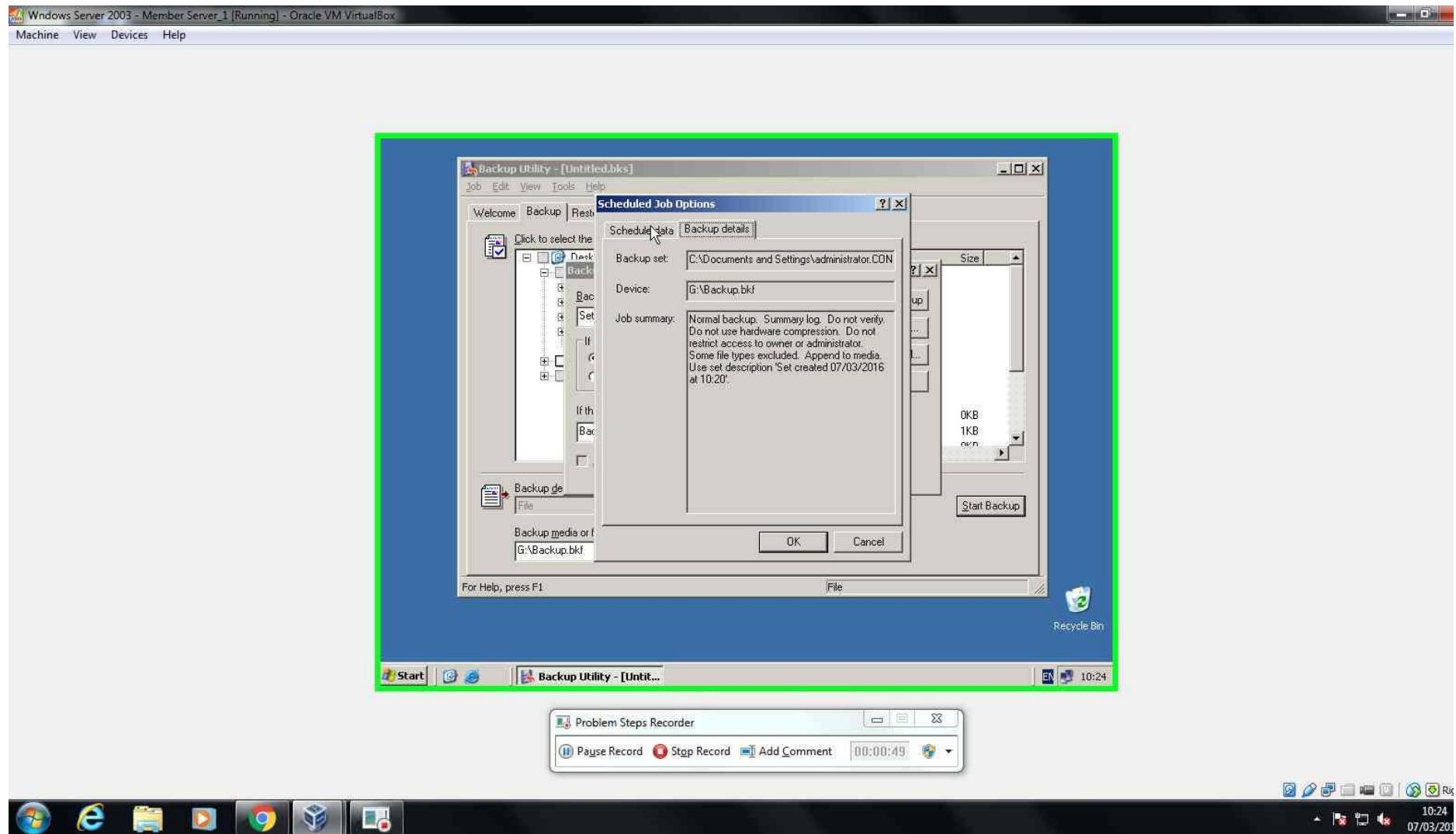


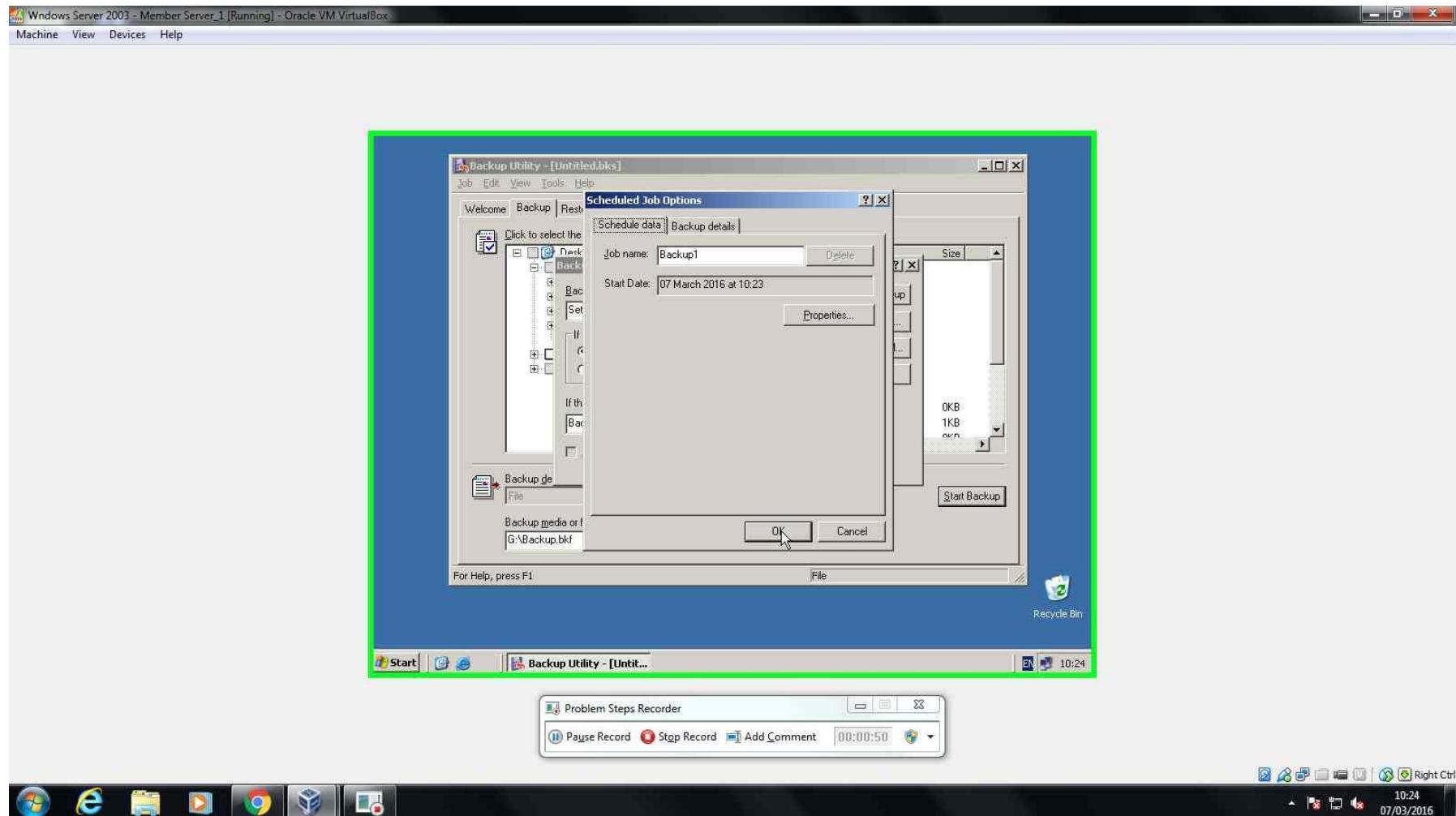


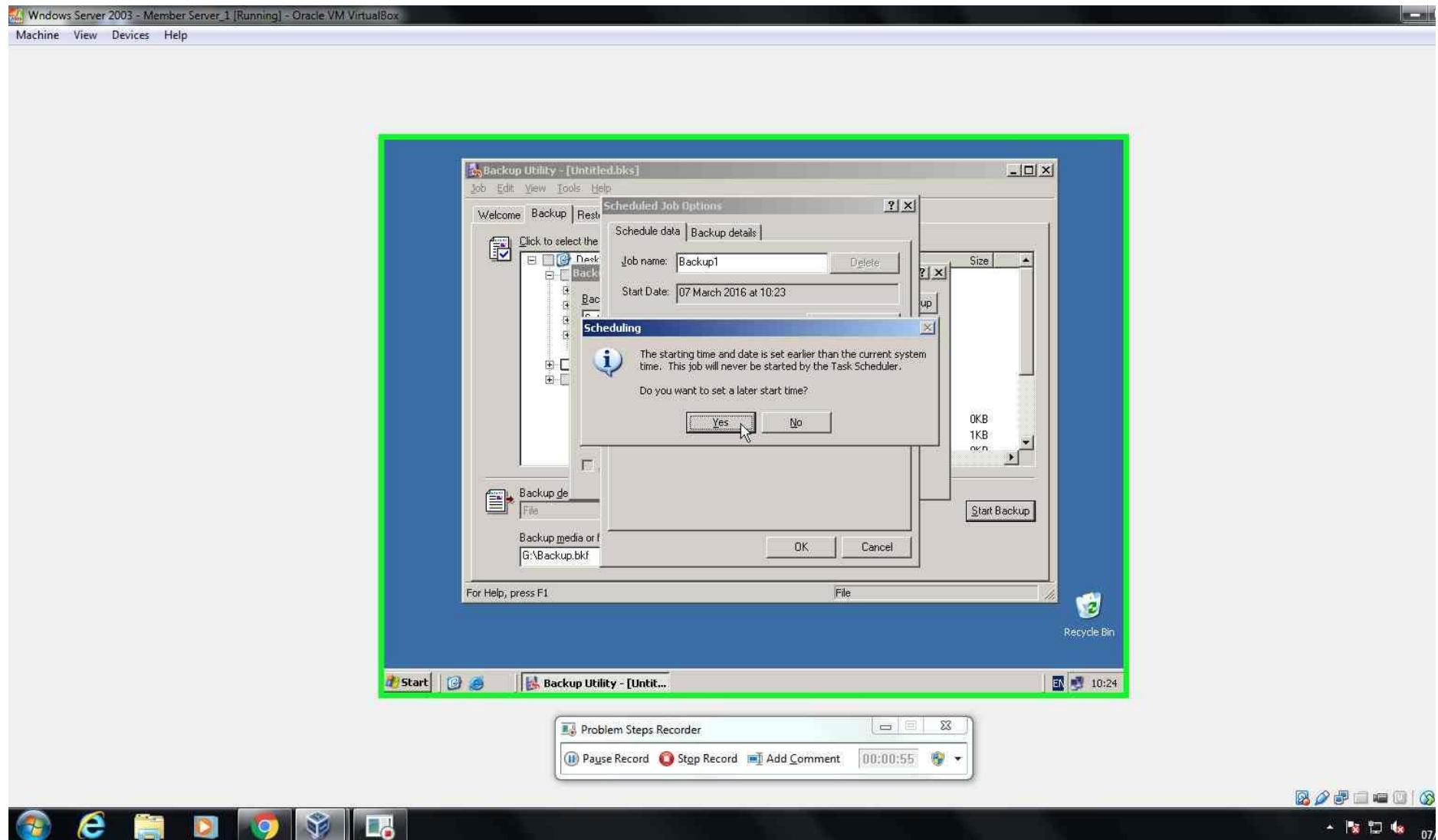


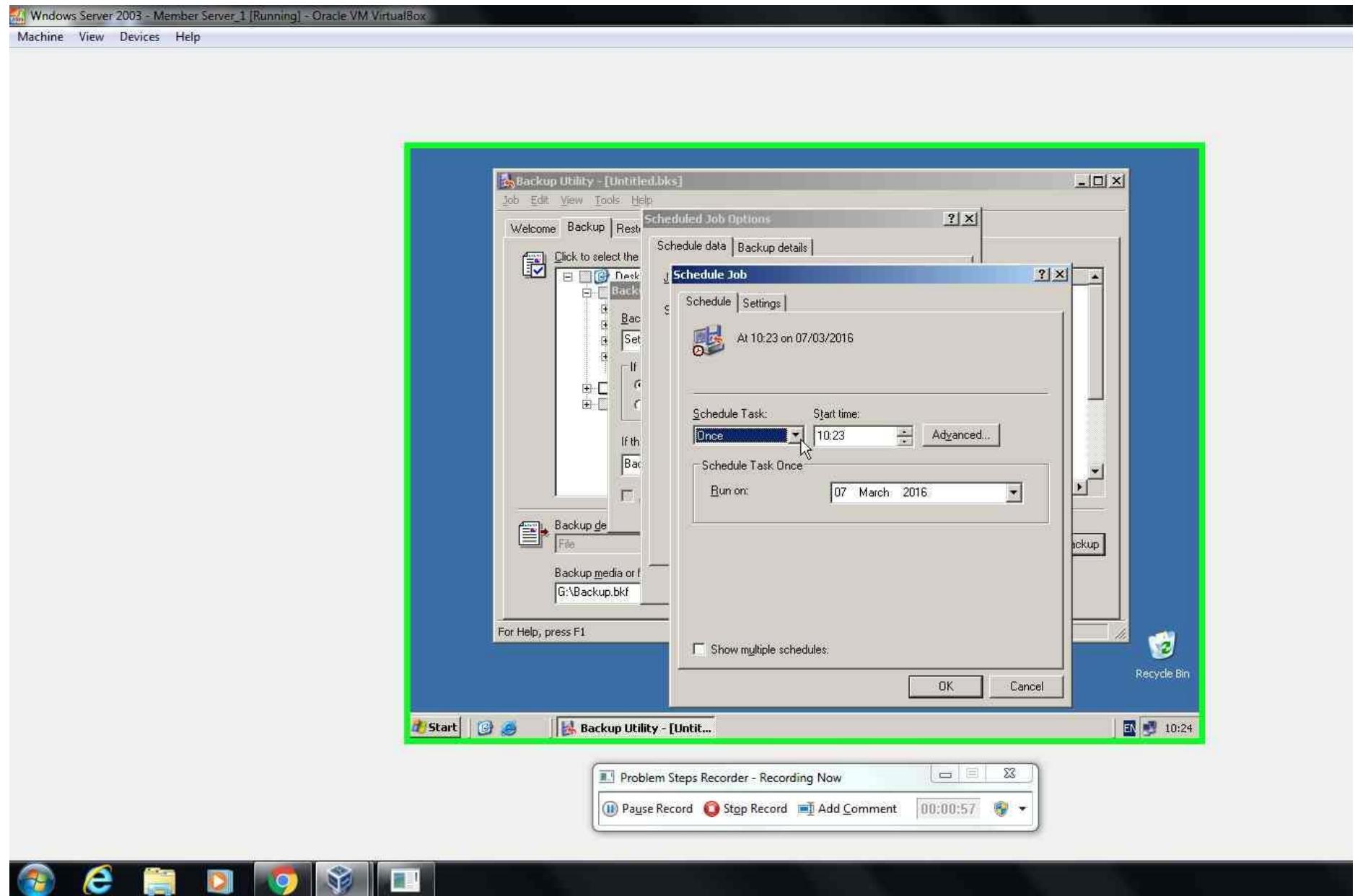


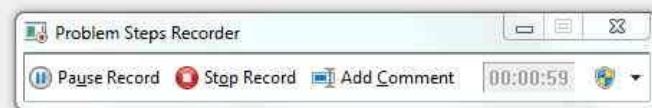
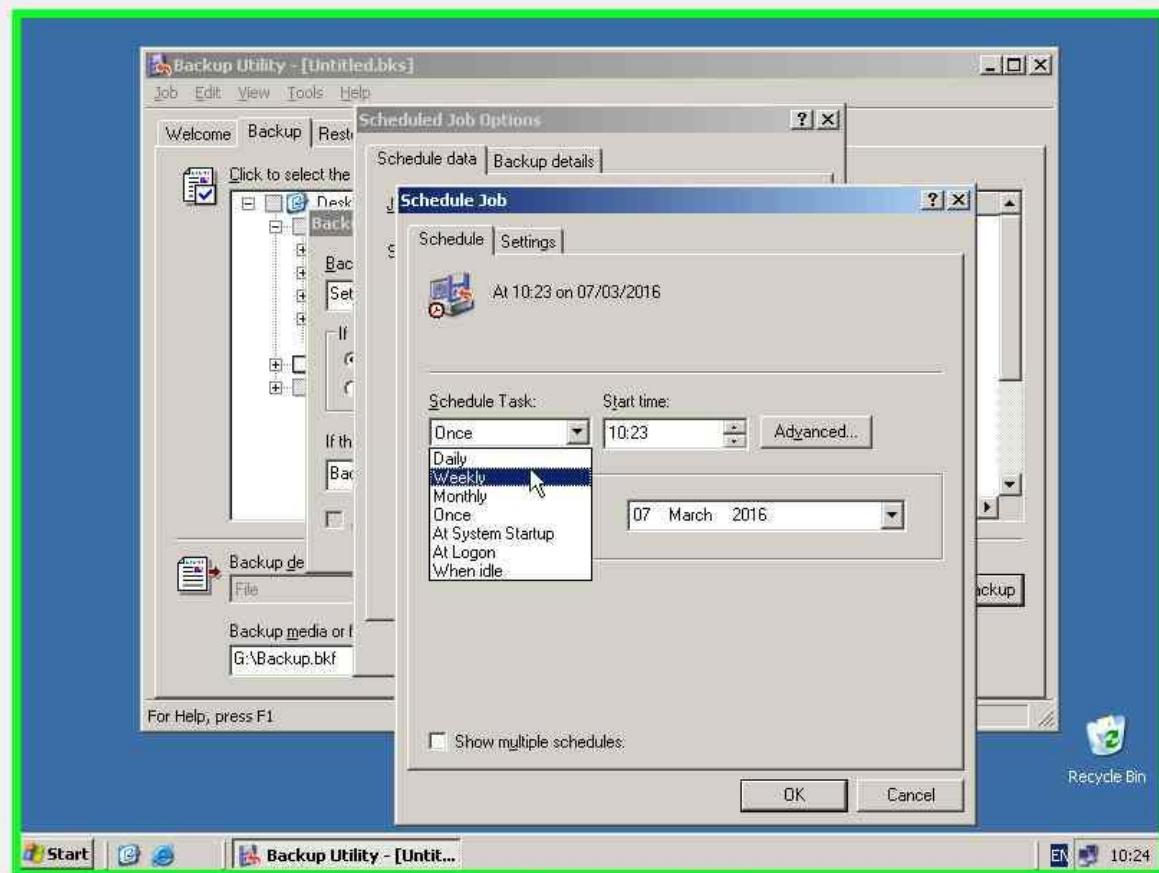


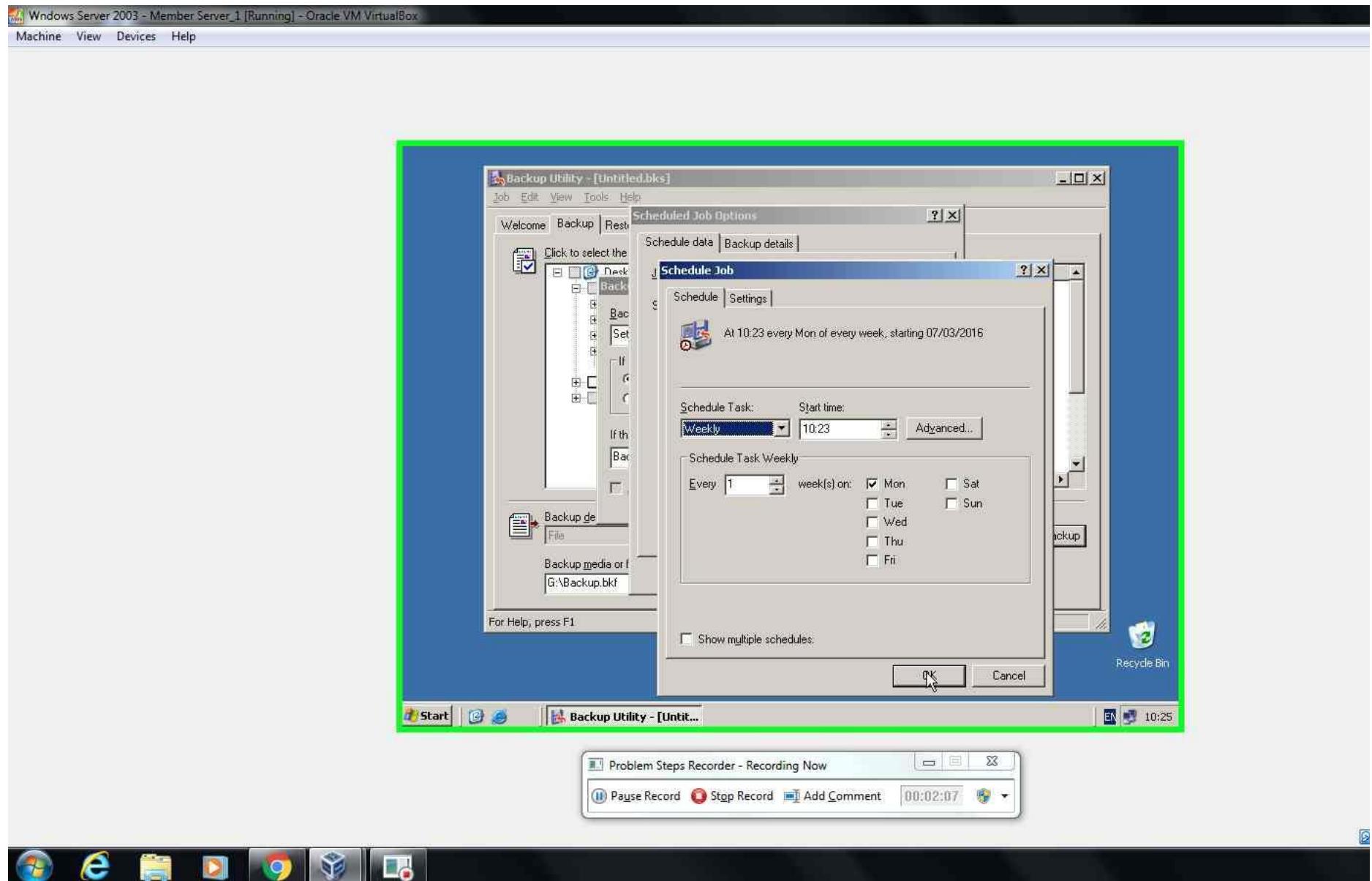


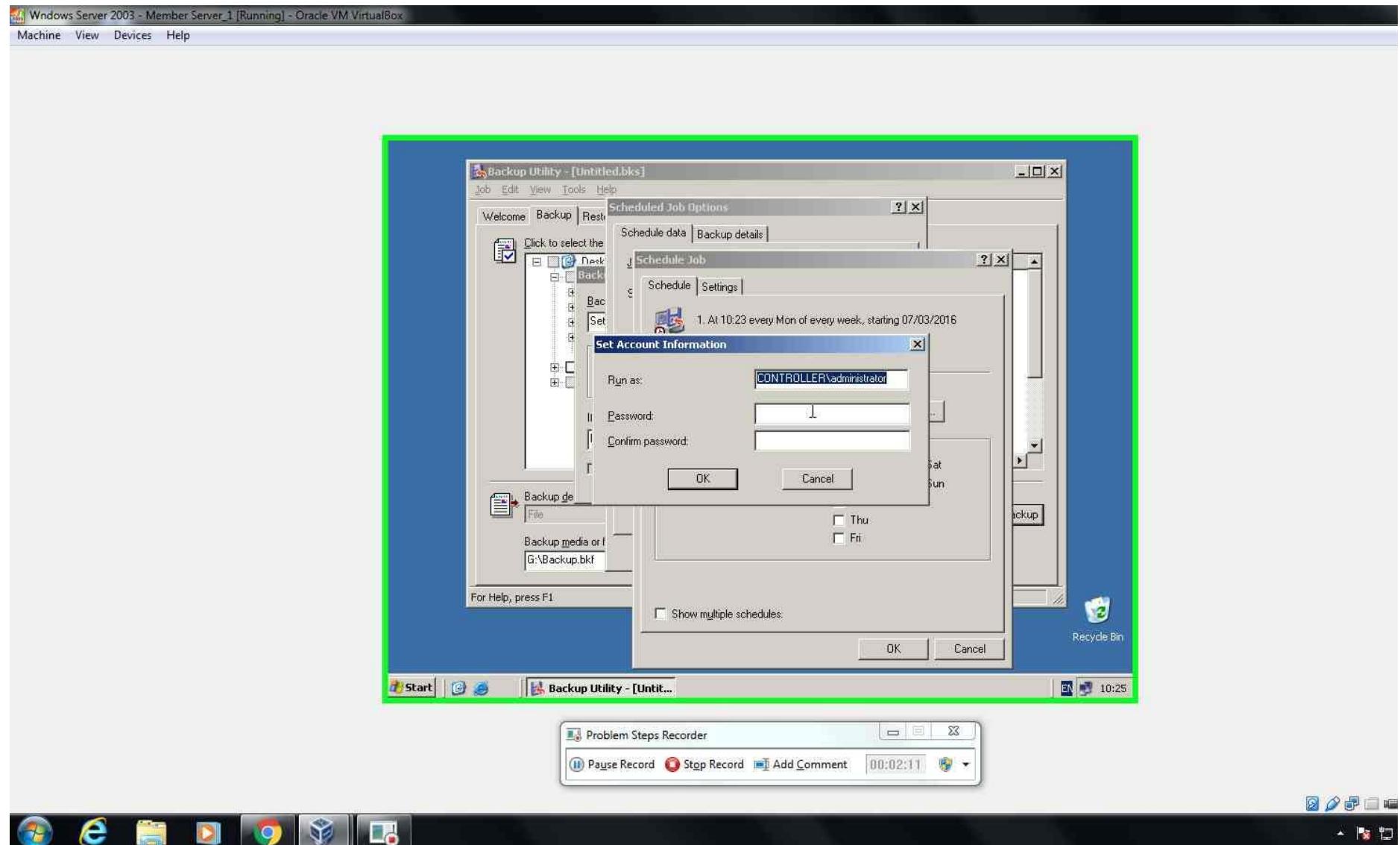


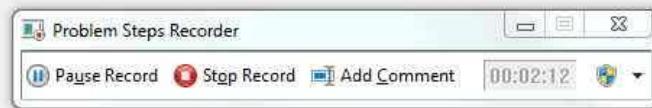
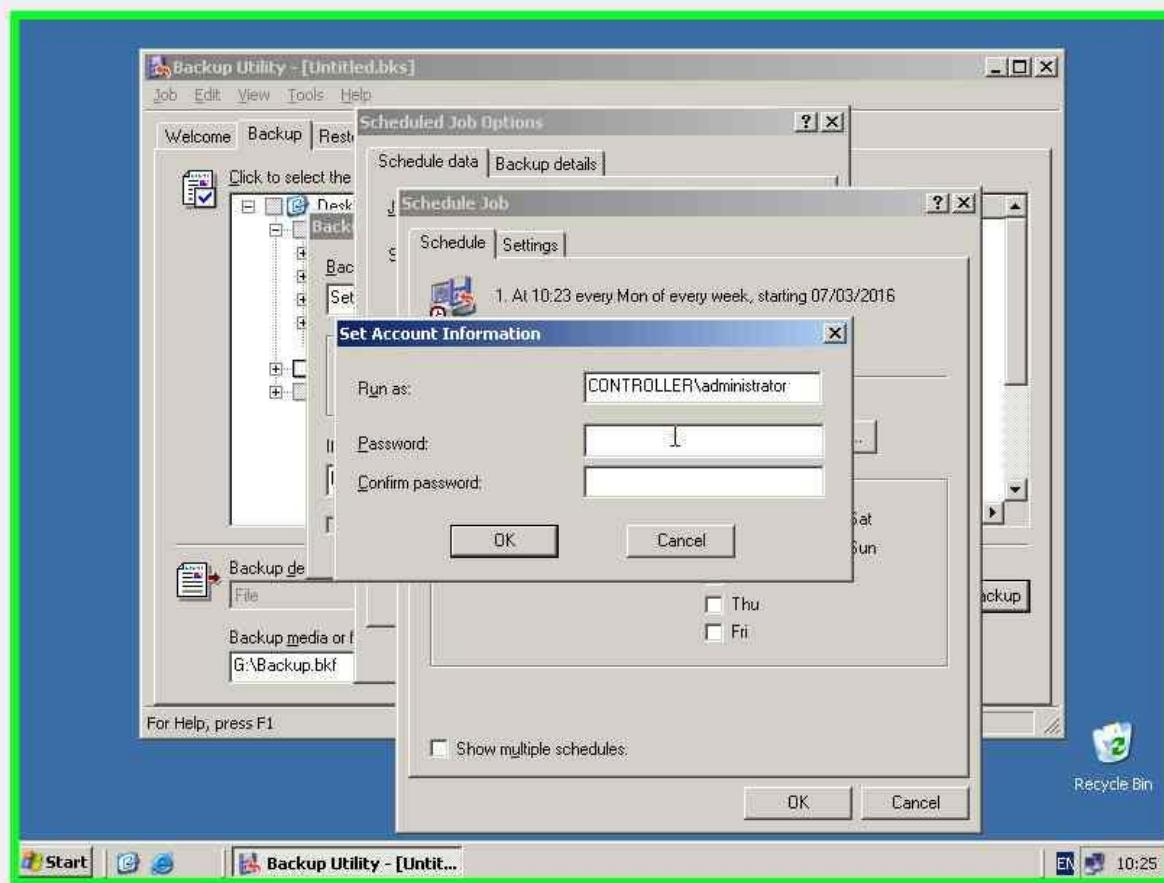


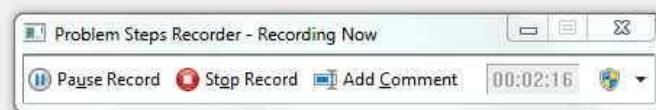
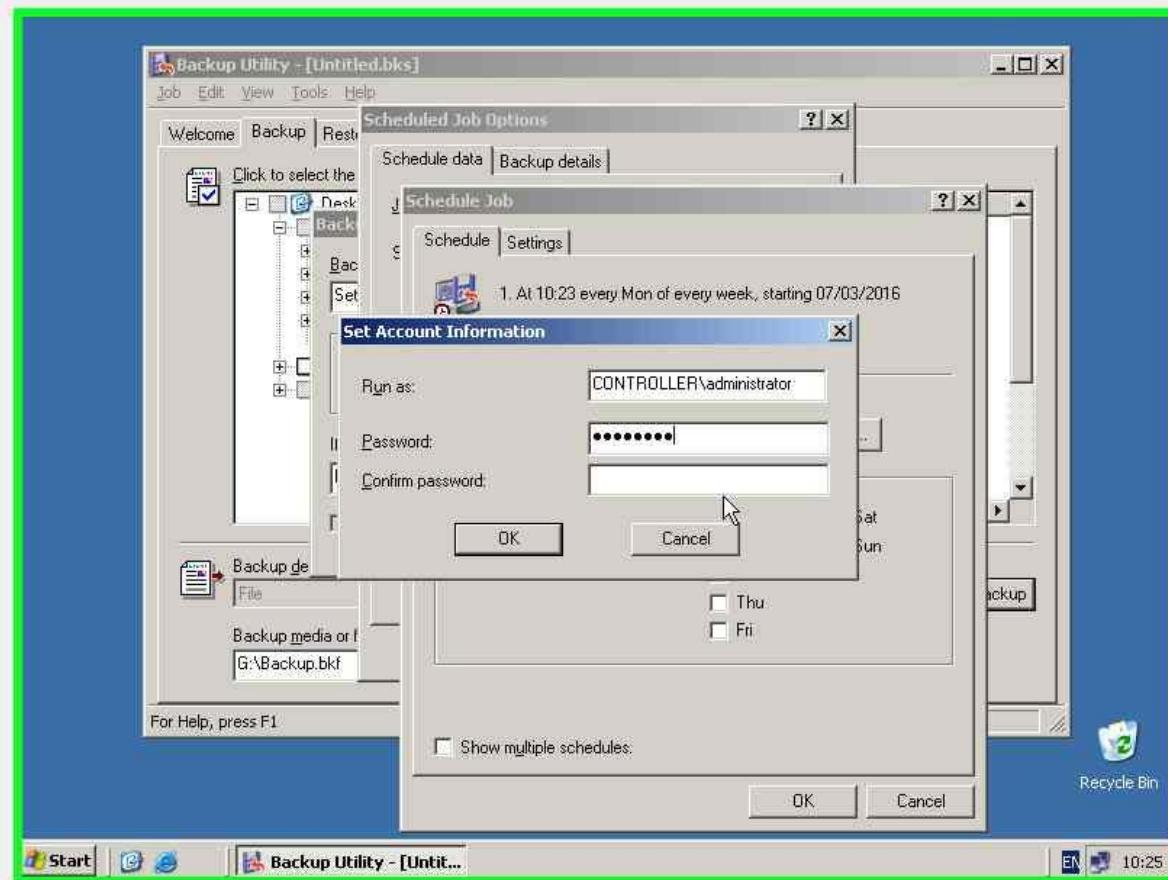


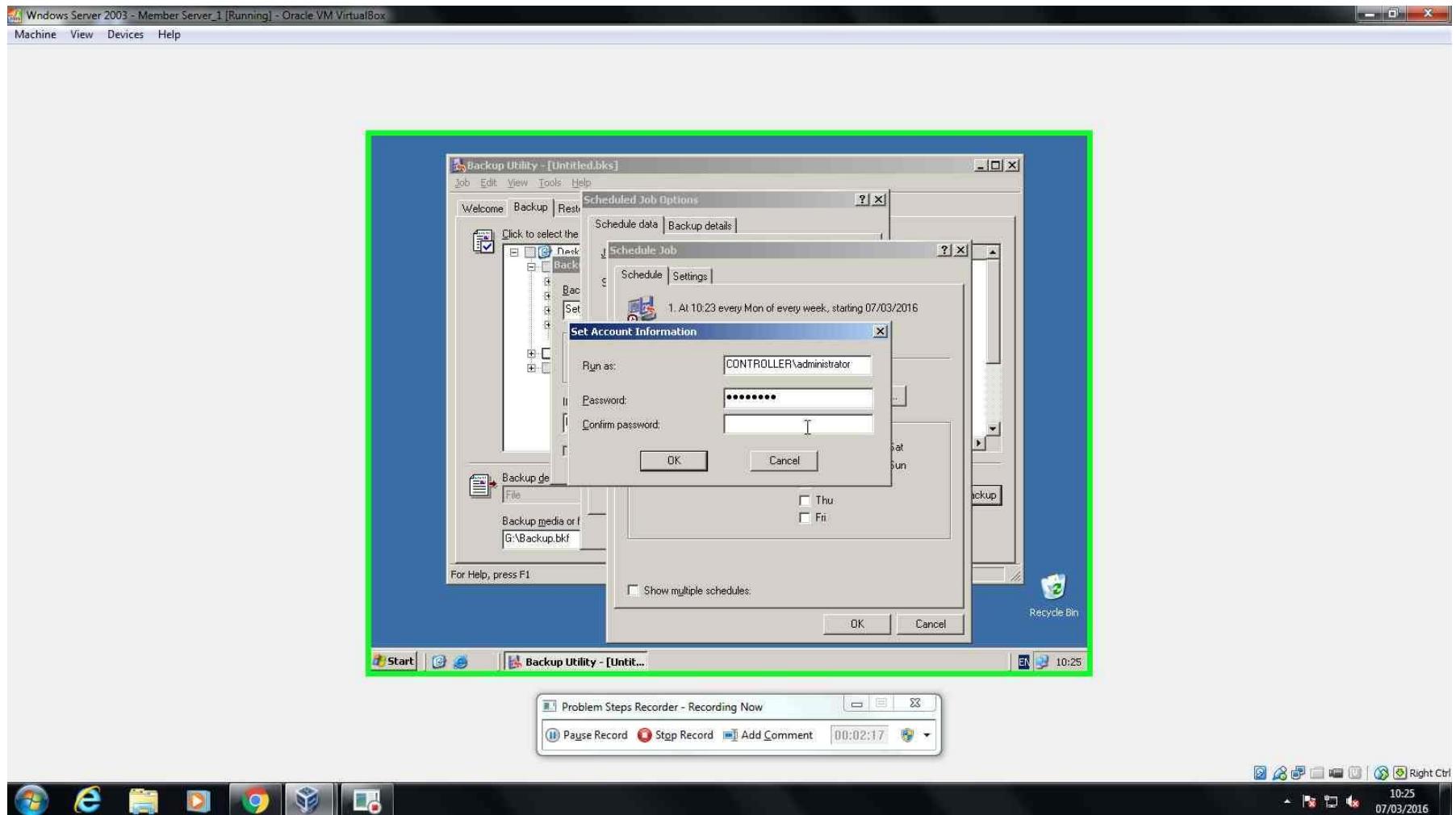


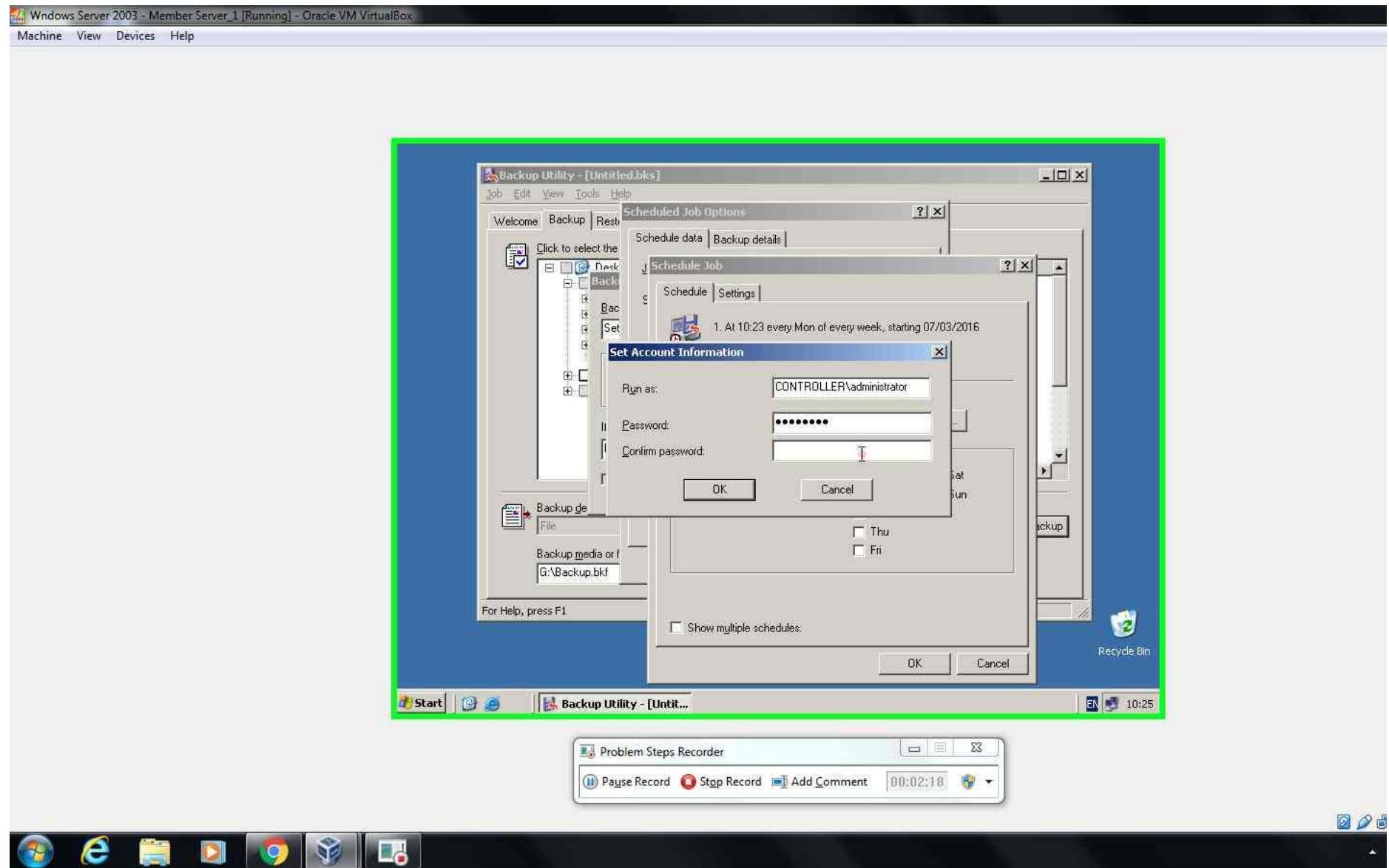


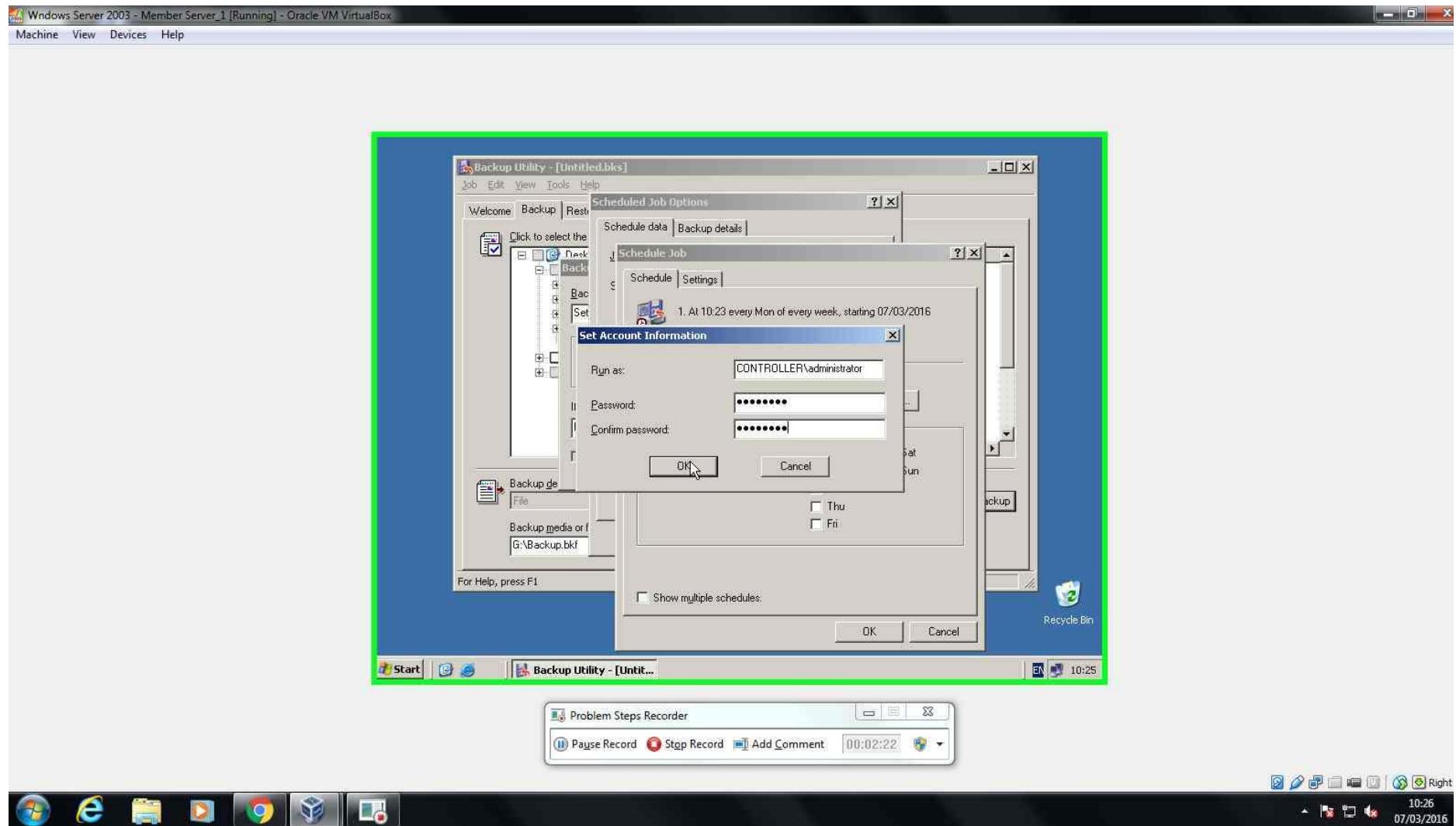


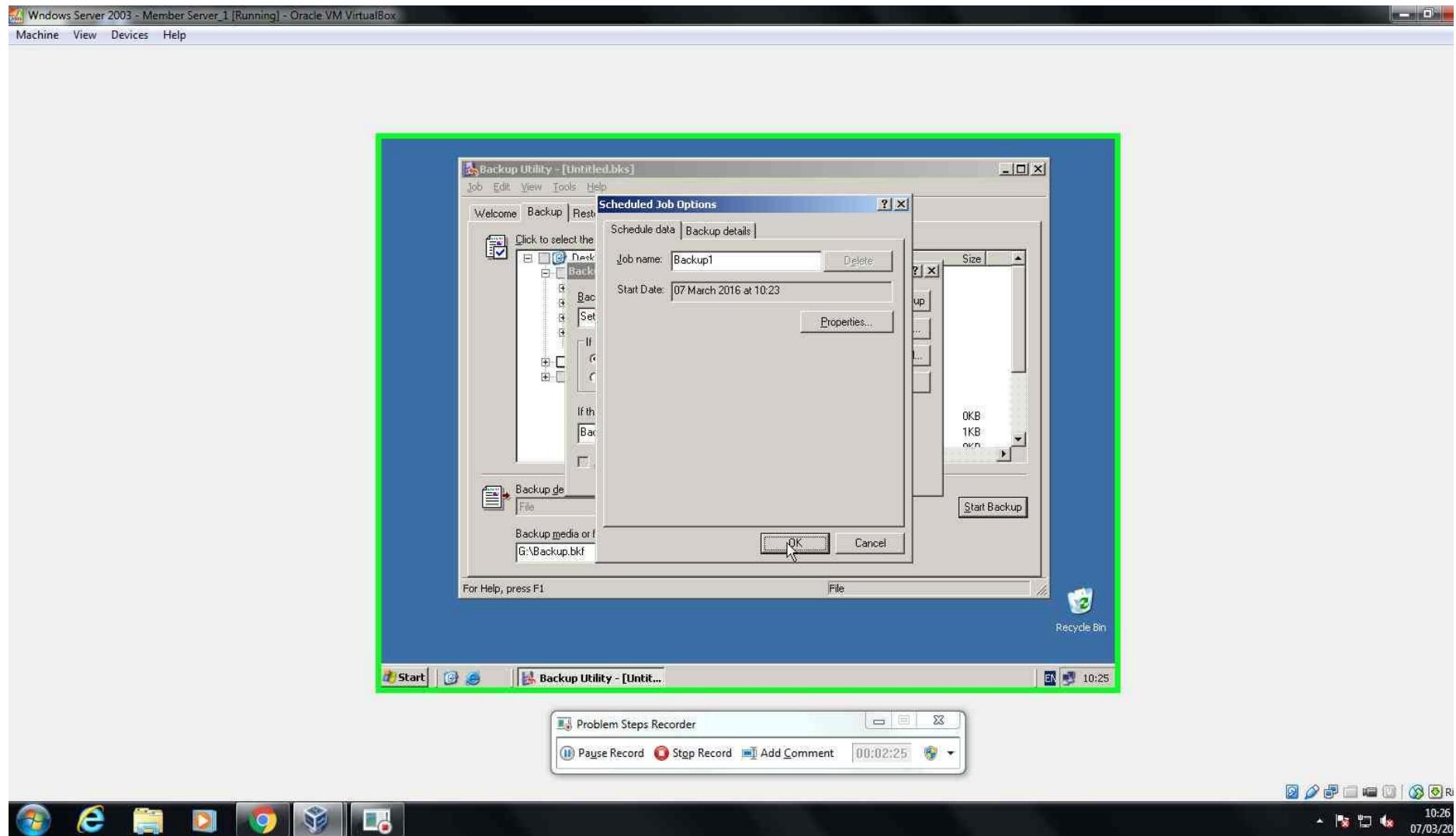


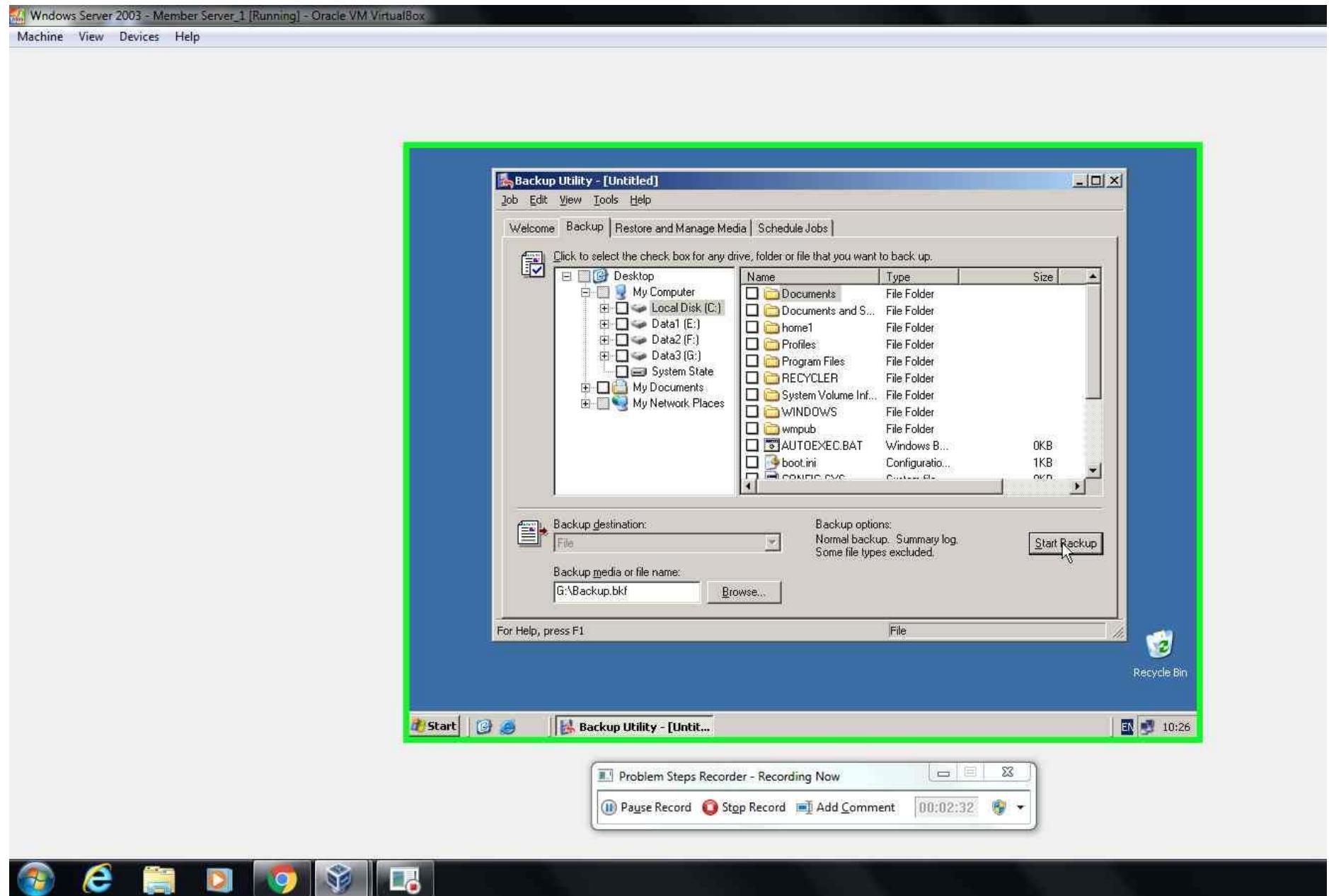


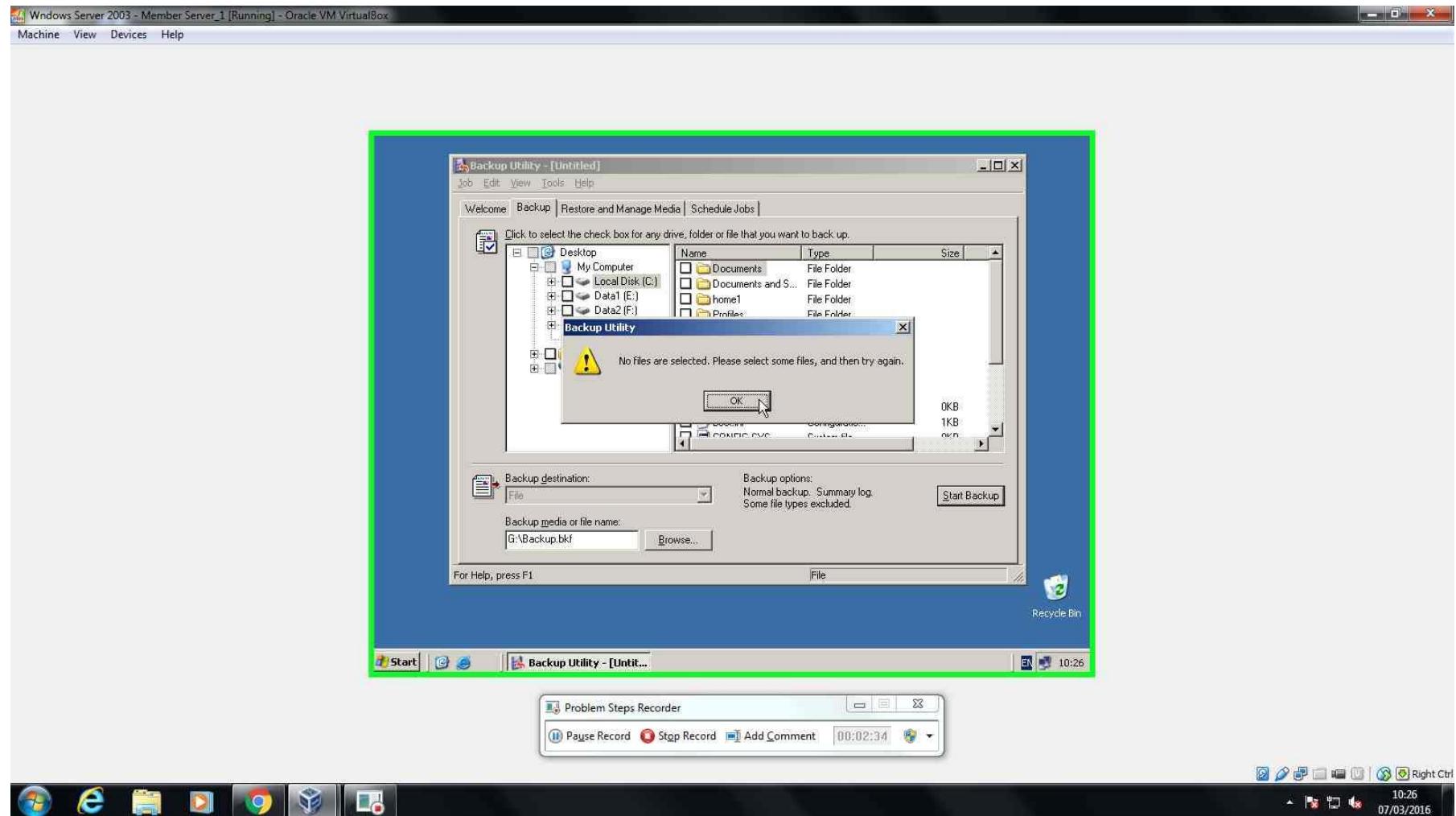


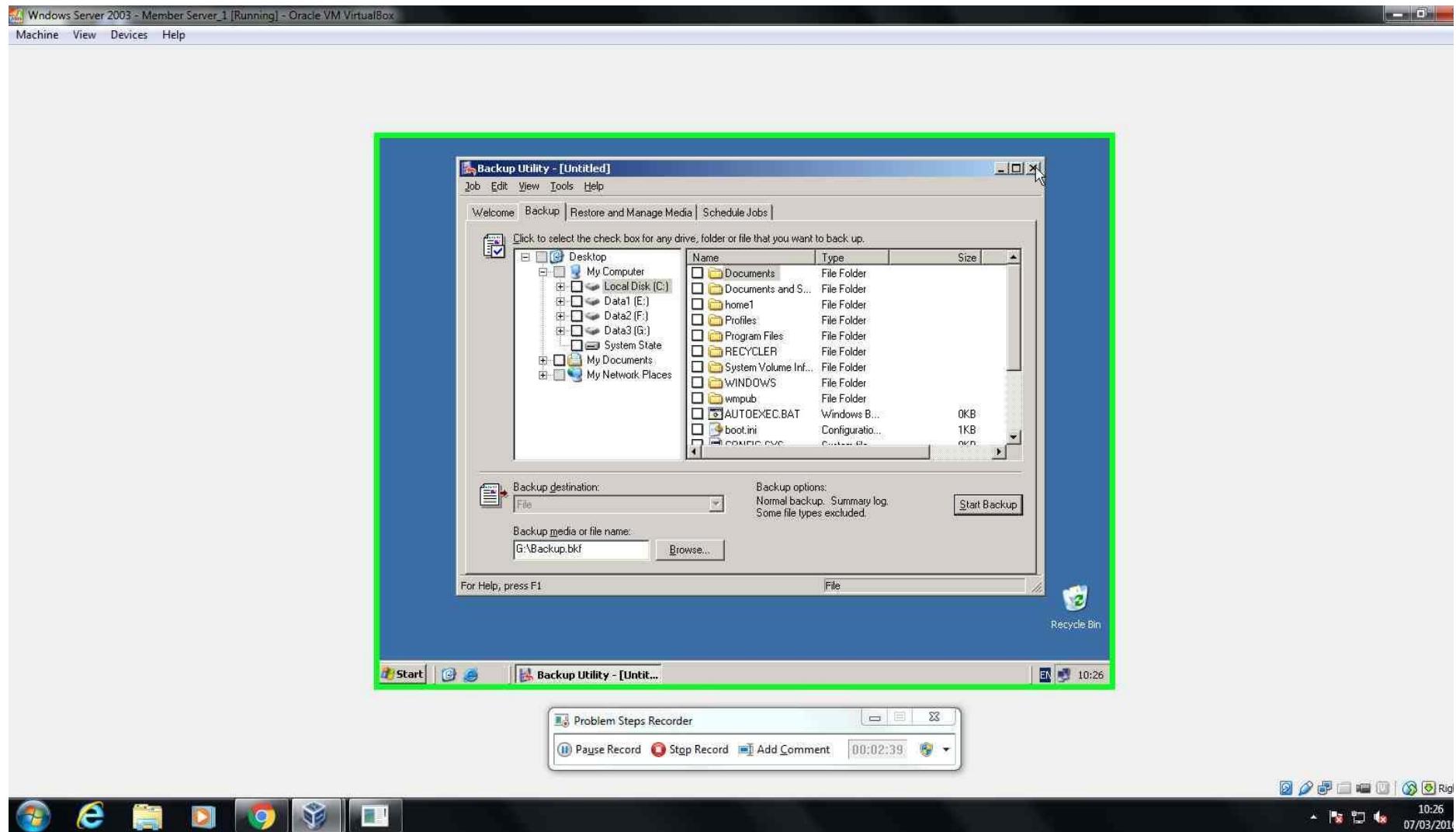




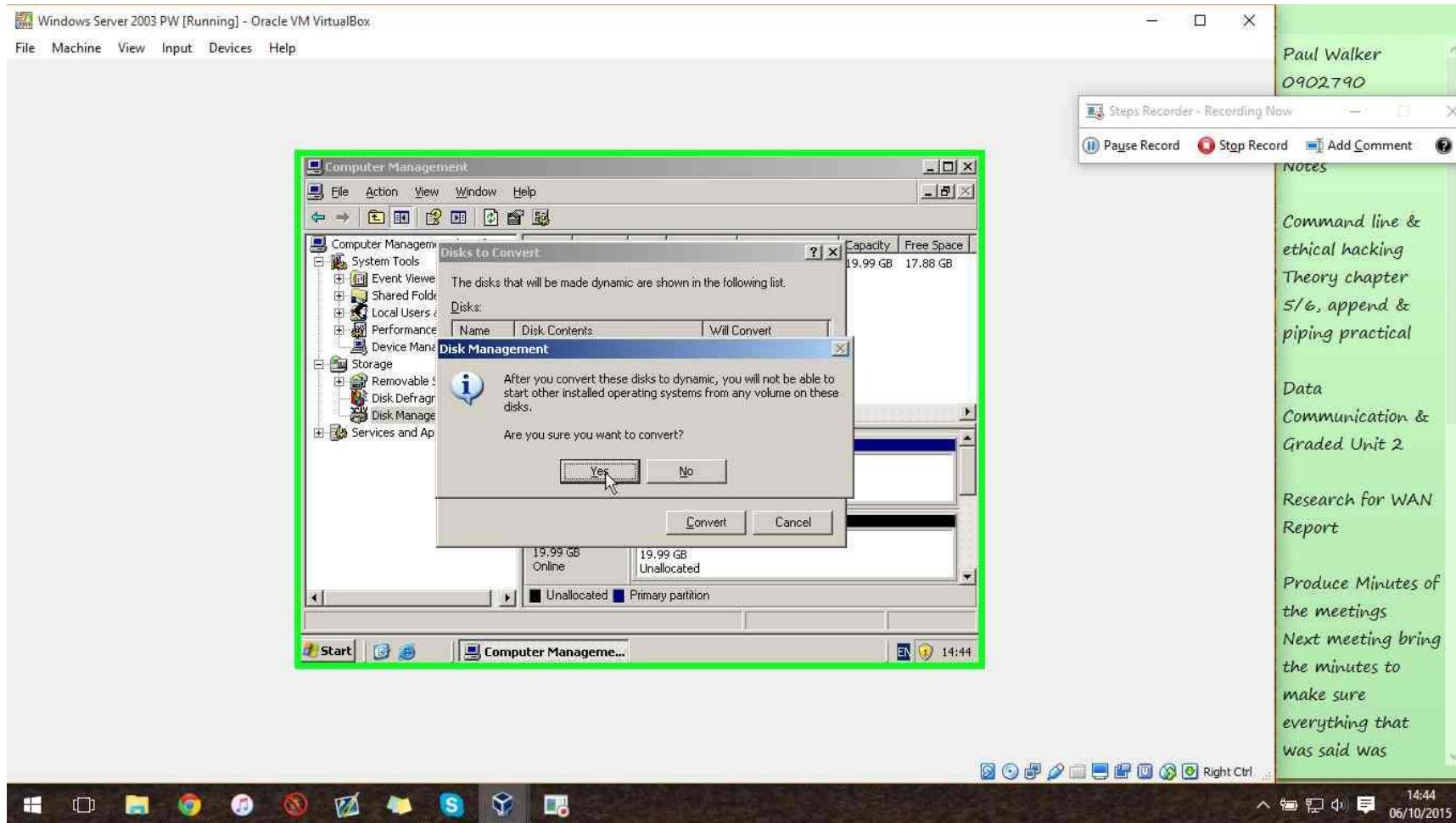






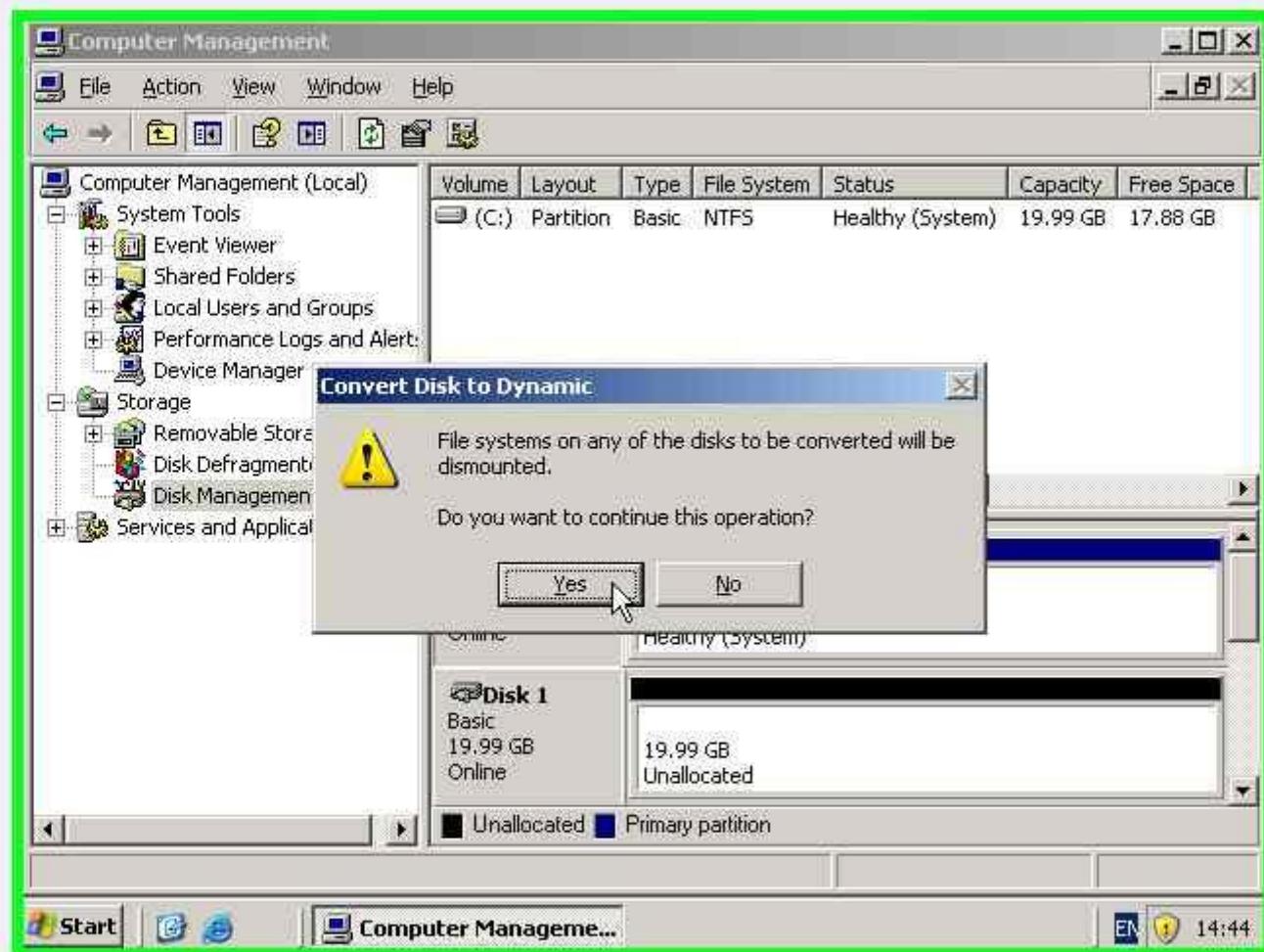


## Appendix 139: Security - RAID 5 PSR



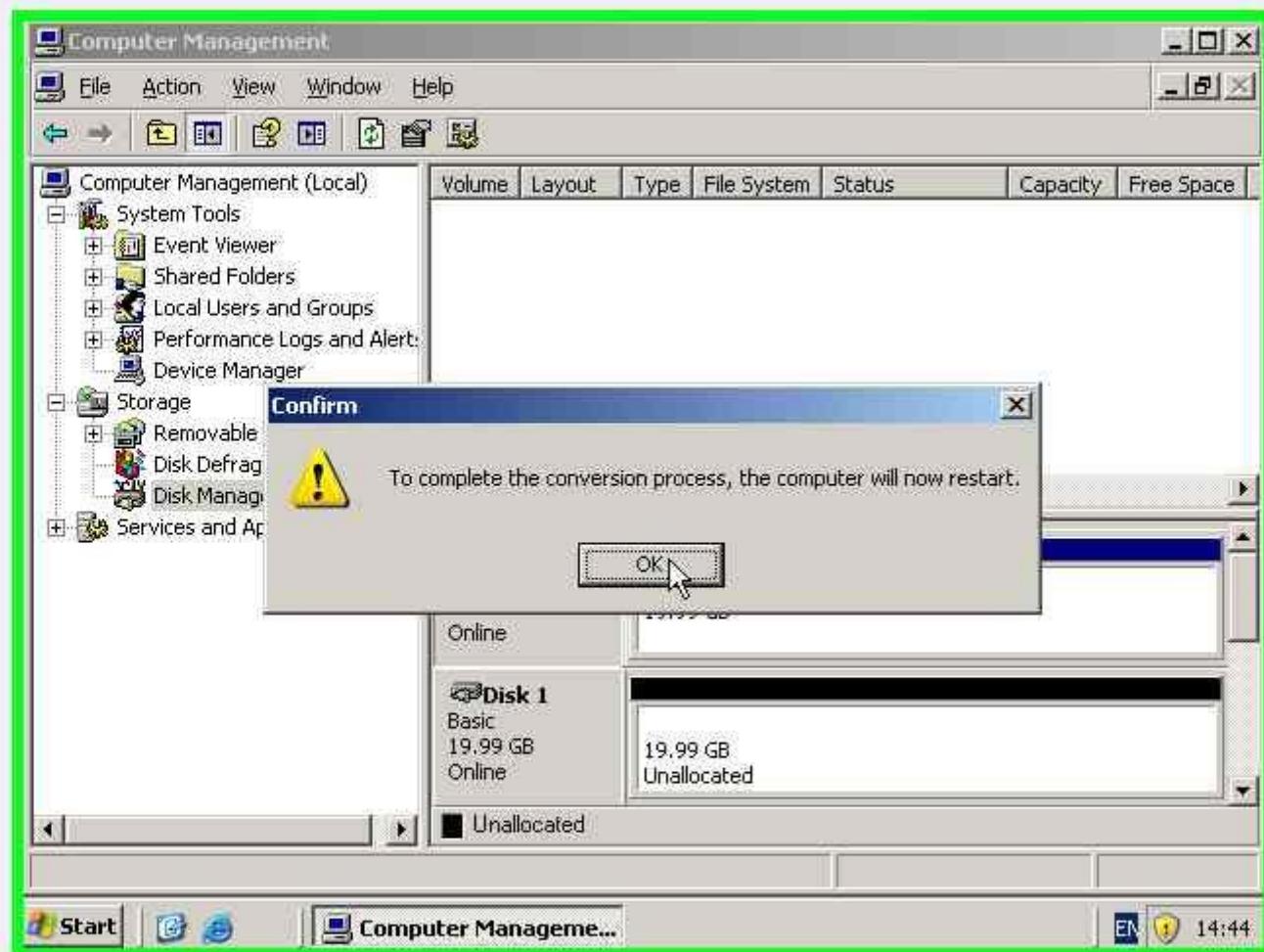
Windows Server 2003 PW [Running] - Oracle VM VirtualBox

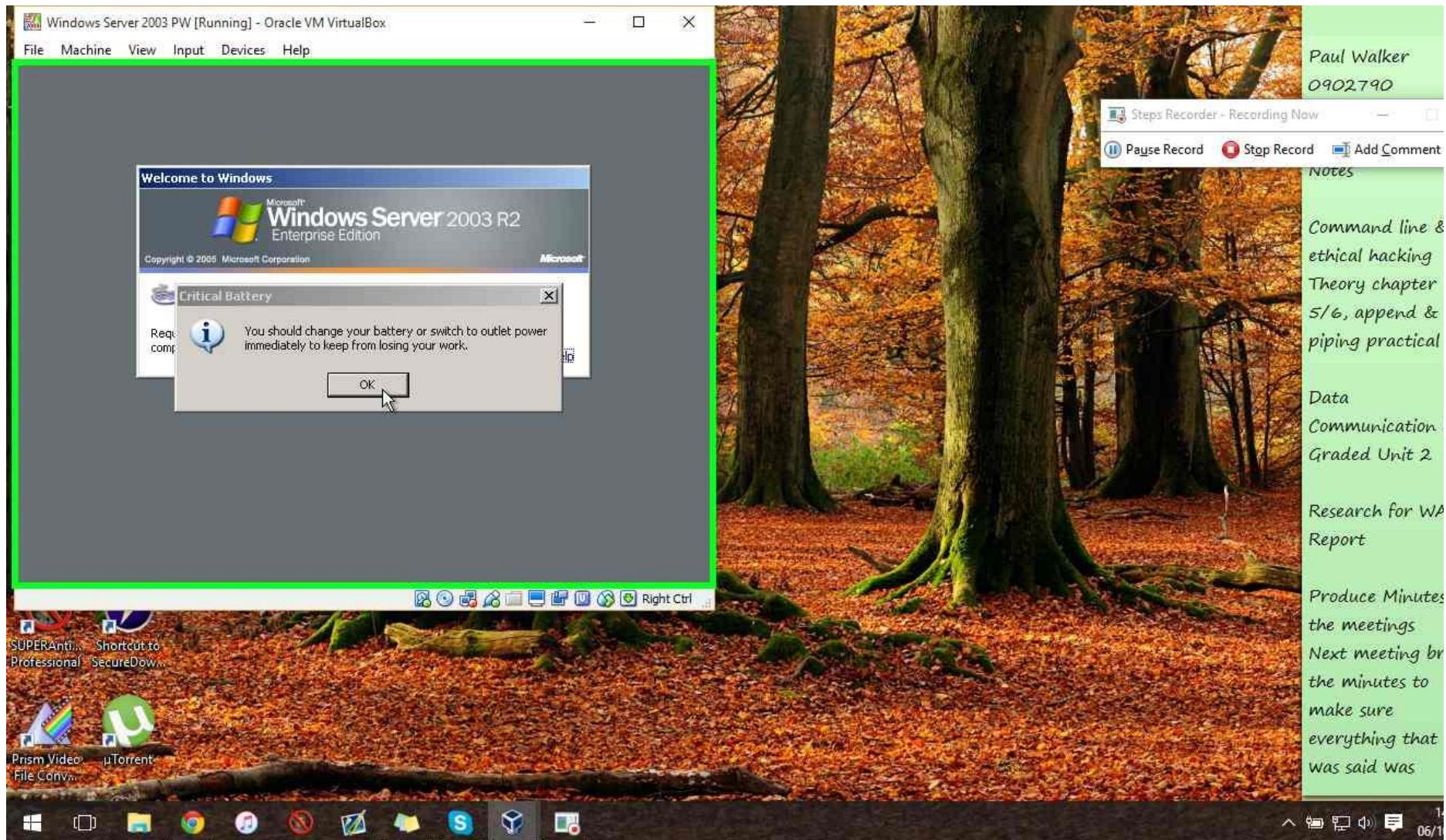
File Machine View Input Devices Help

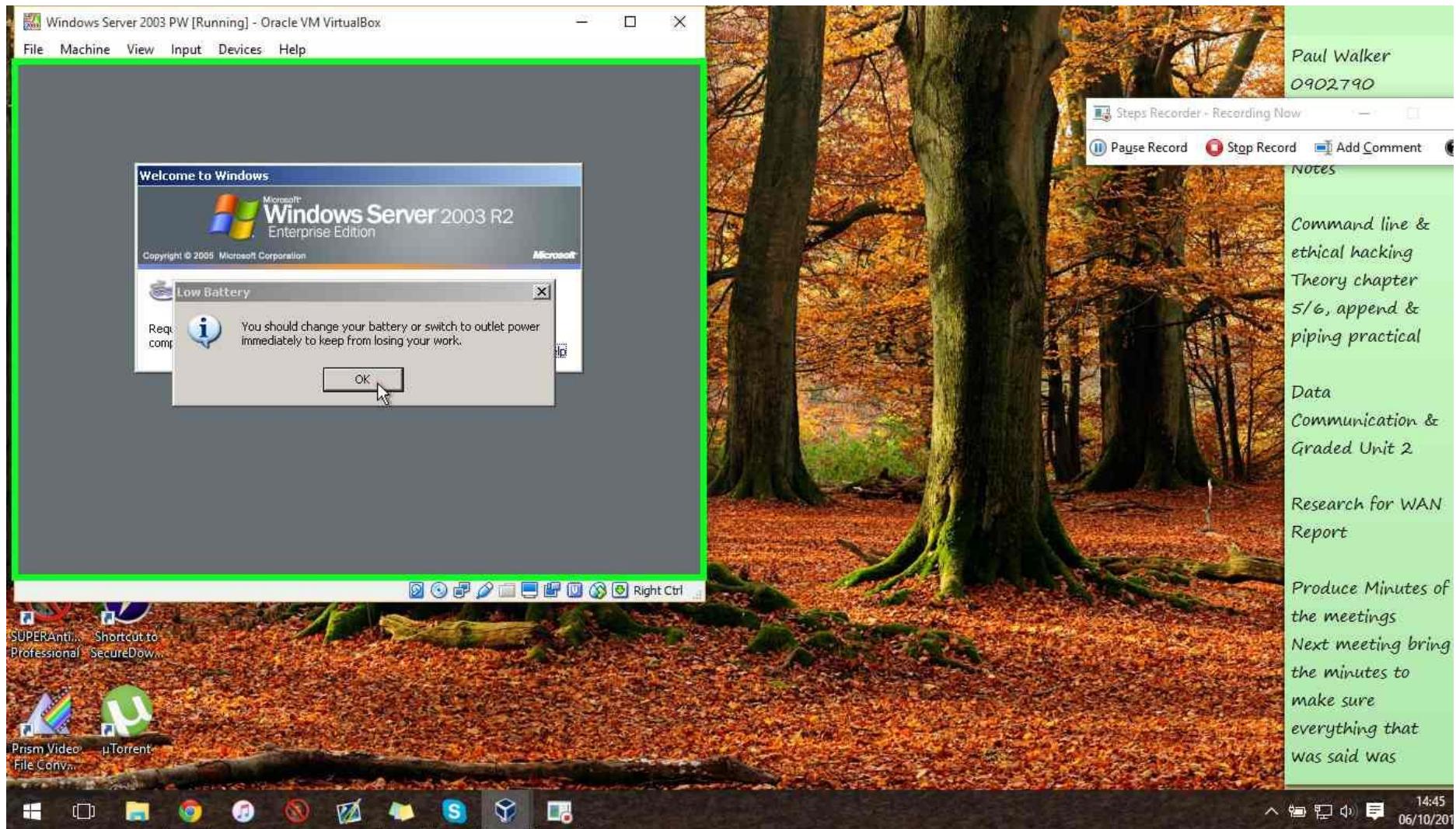


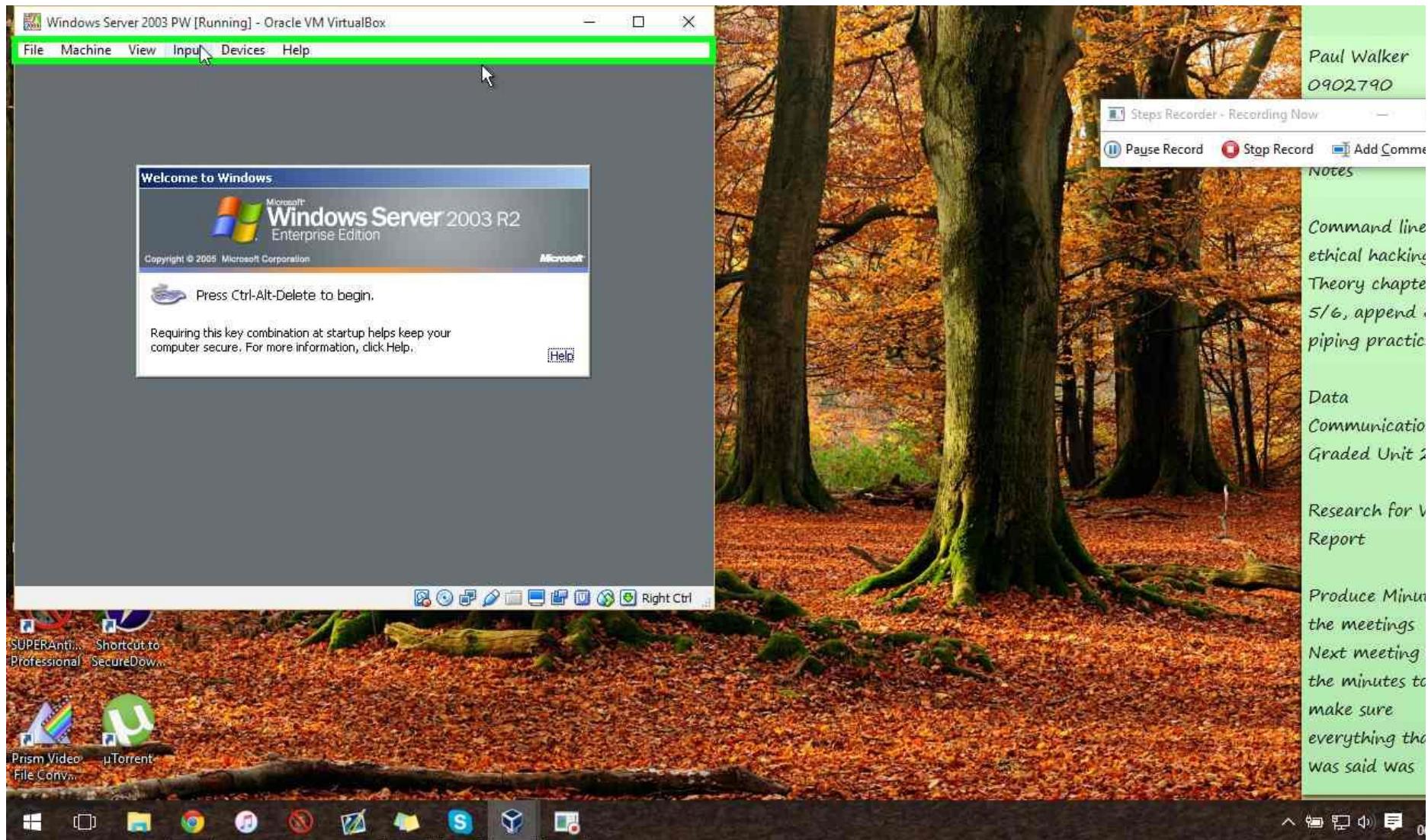
Windows Server 2003 PW [Running] - Oracle VM VirtualBox

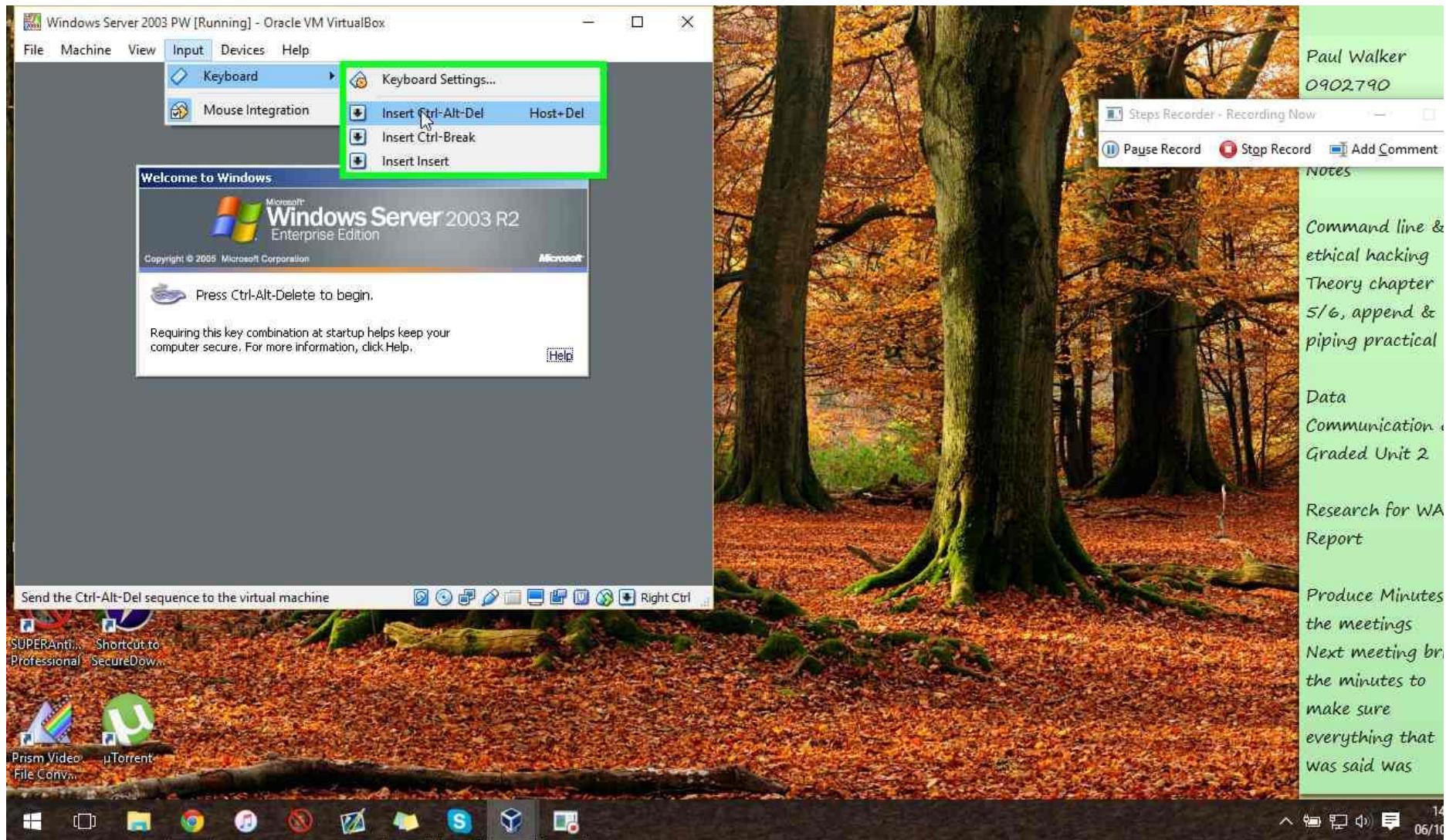
File Machine View Input Devices Help

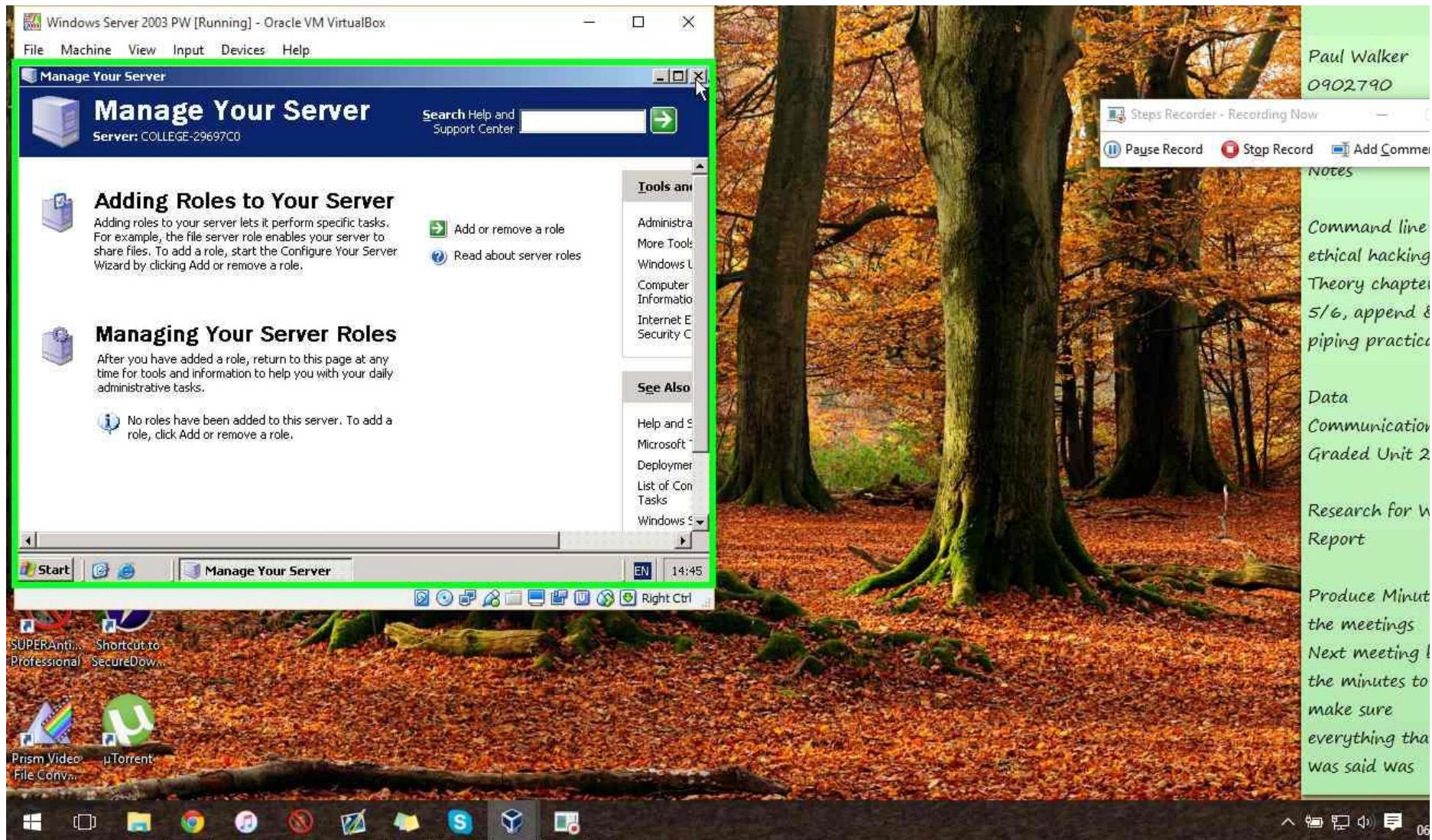


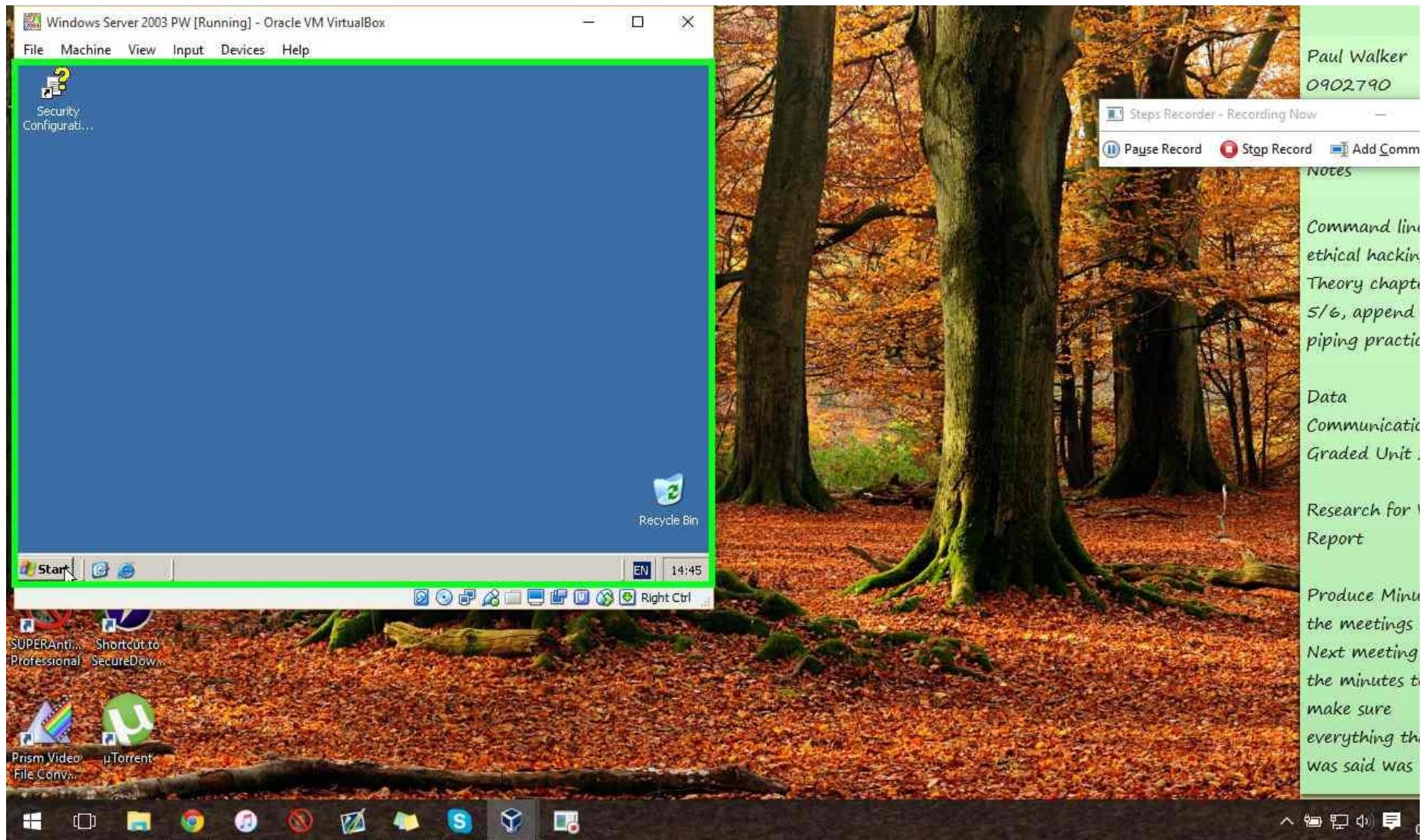


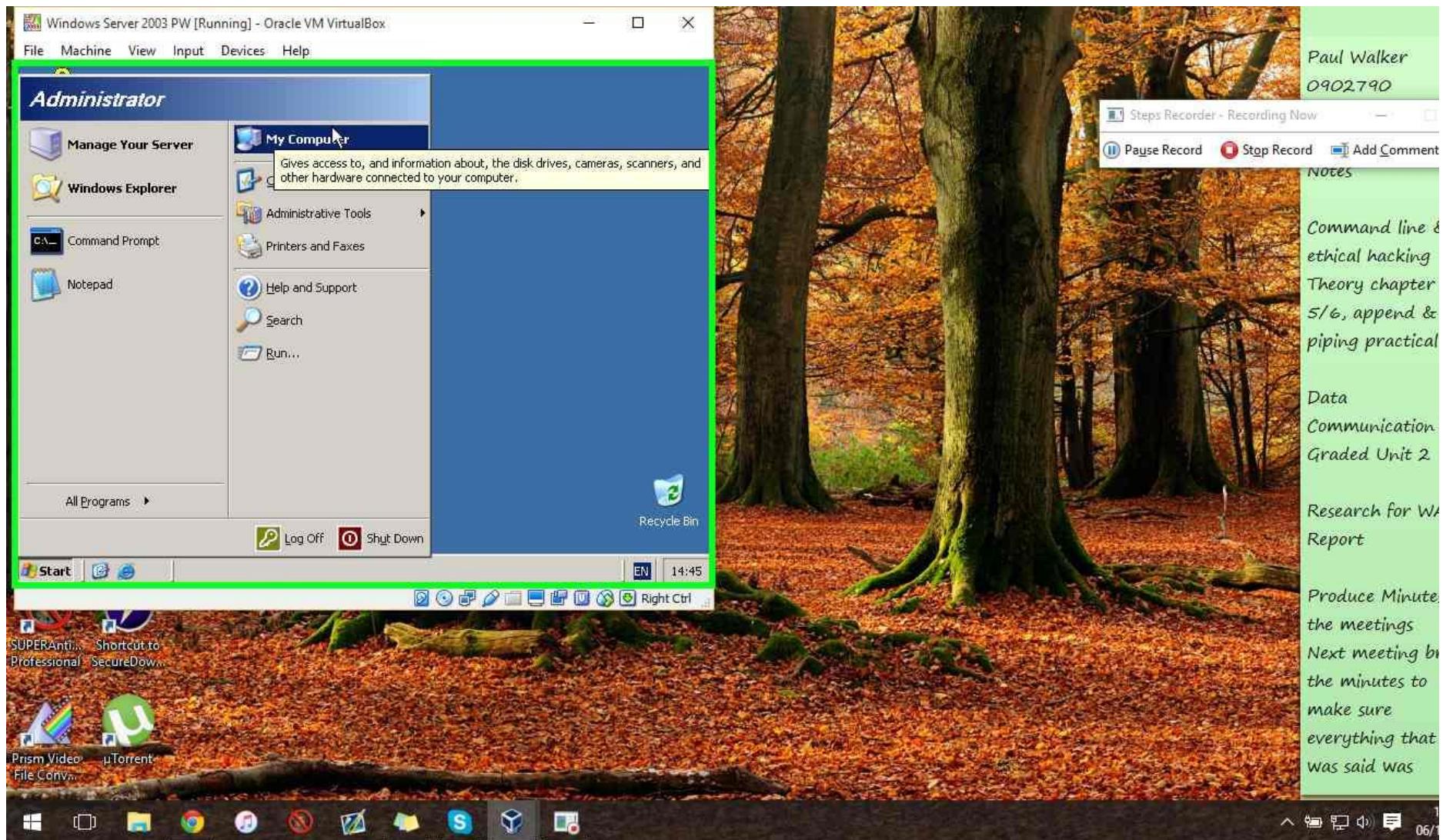


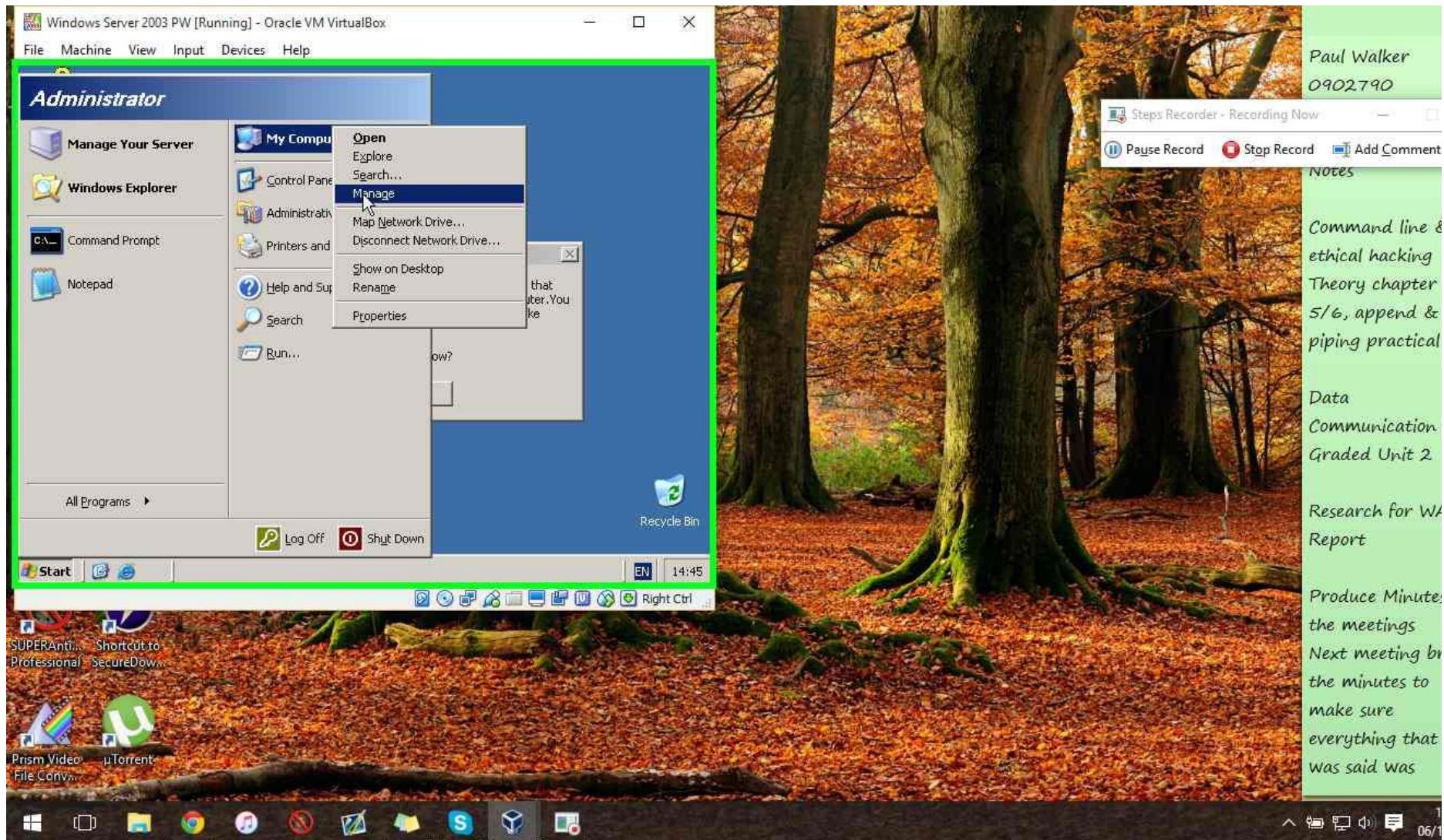


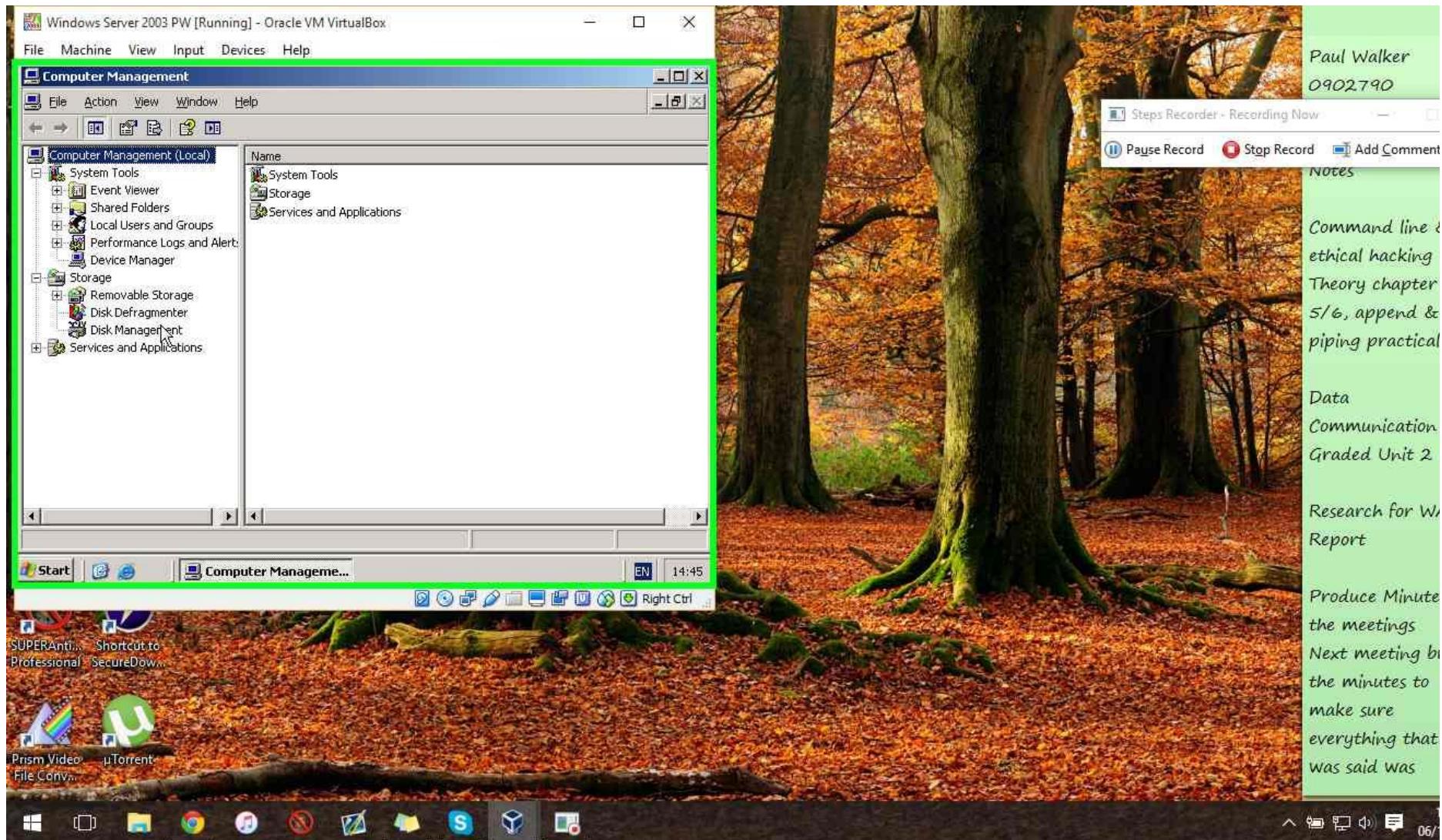


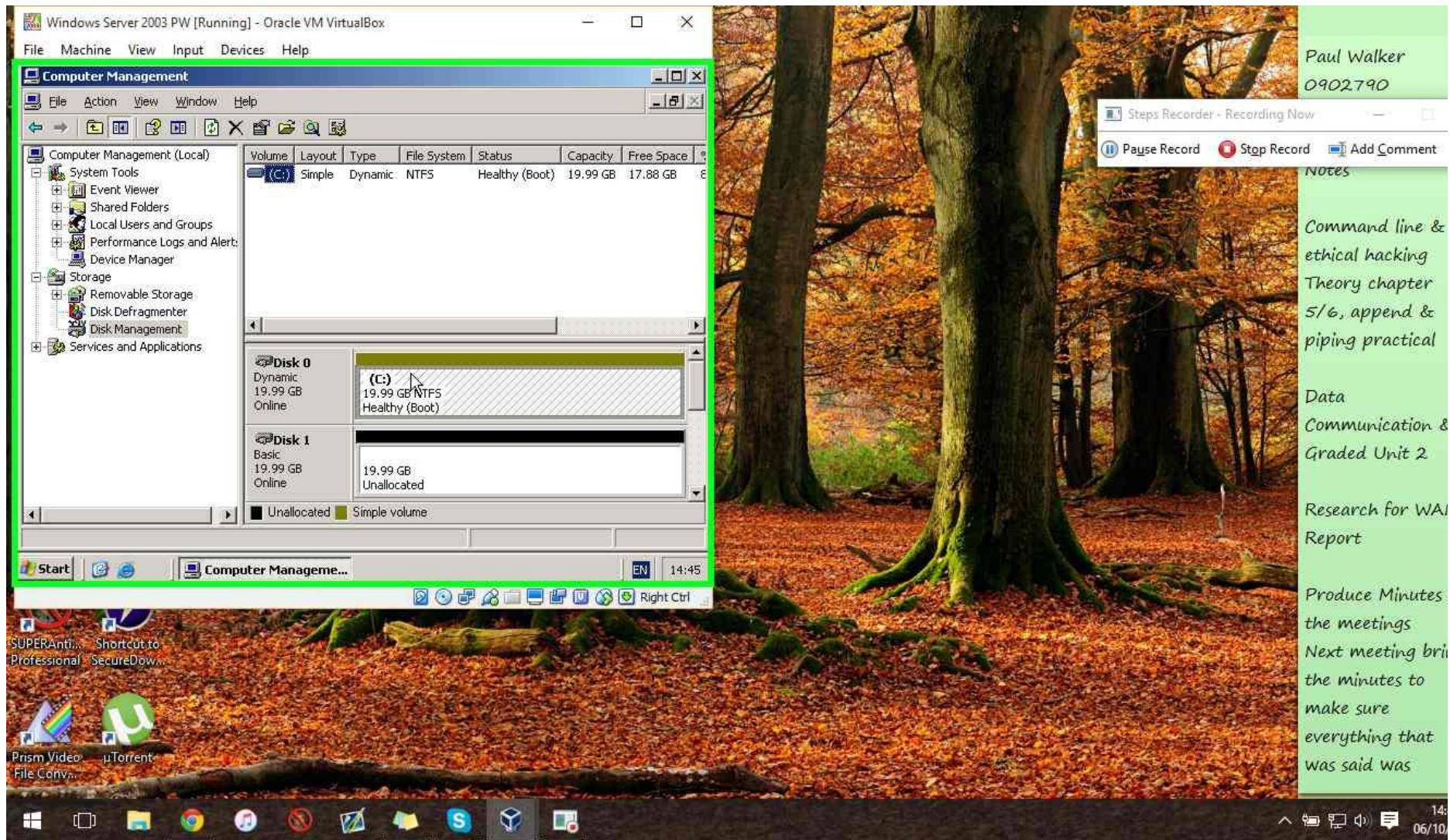


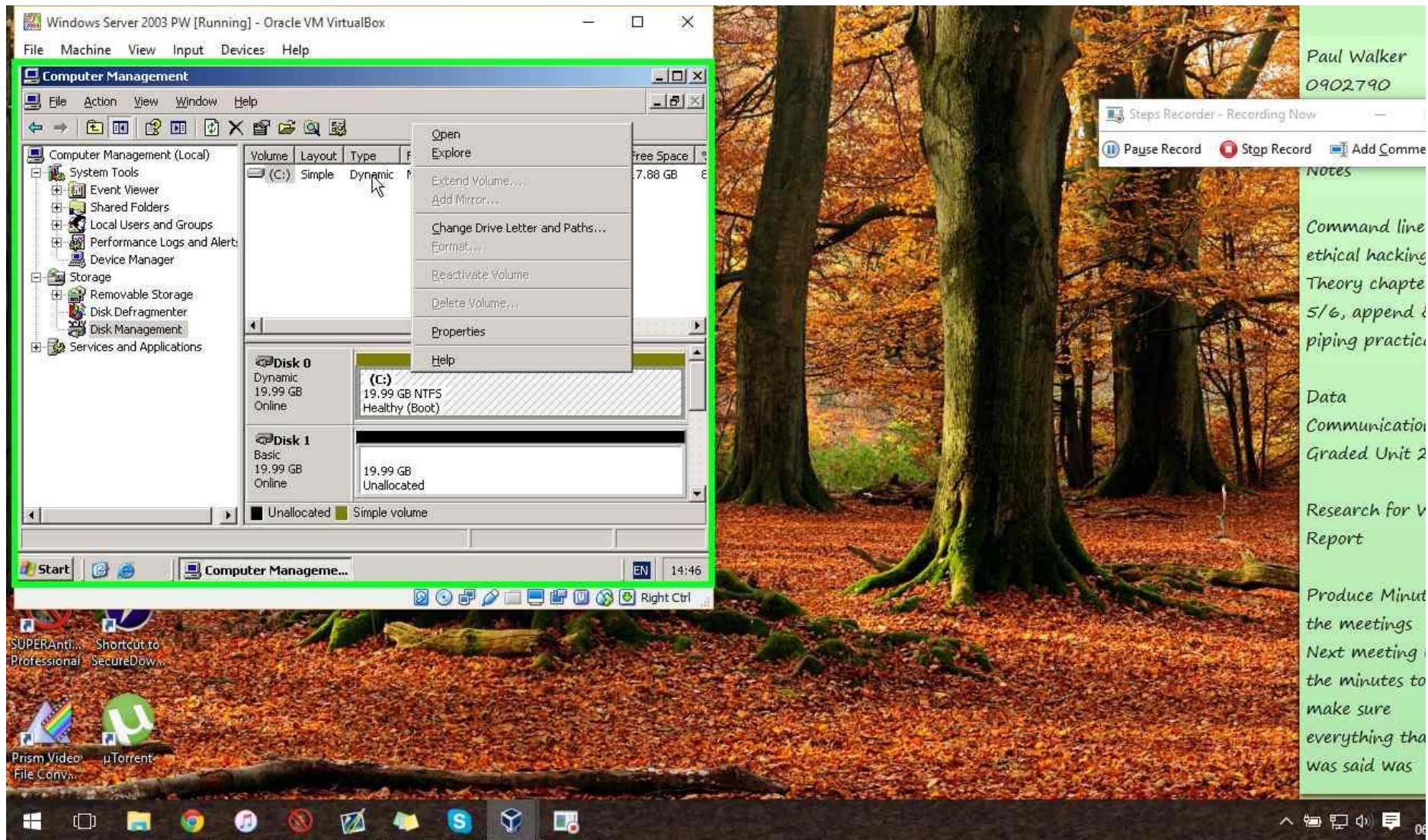


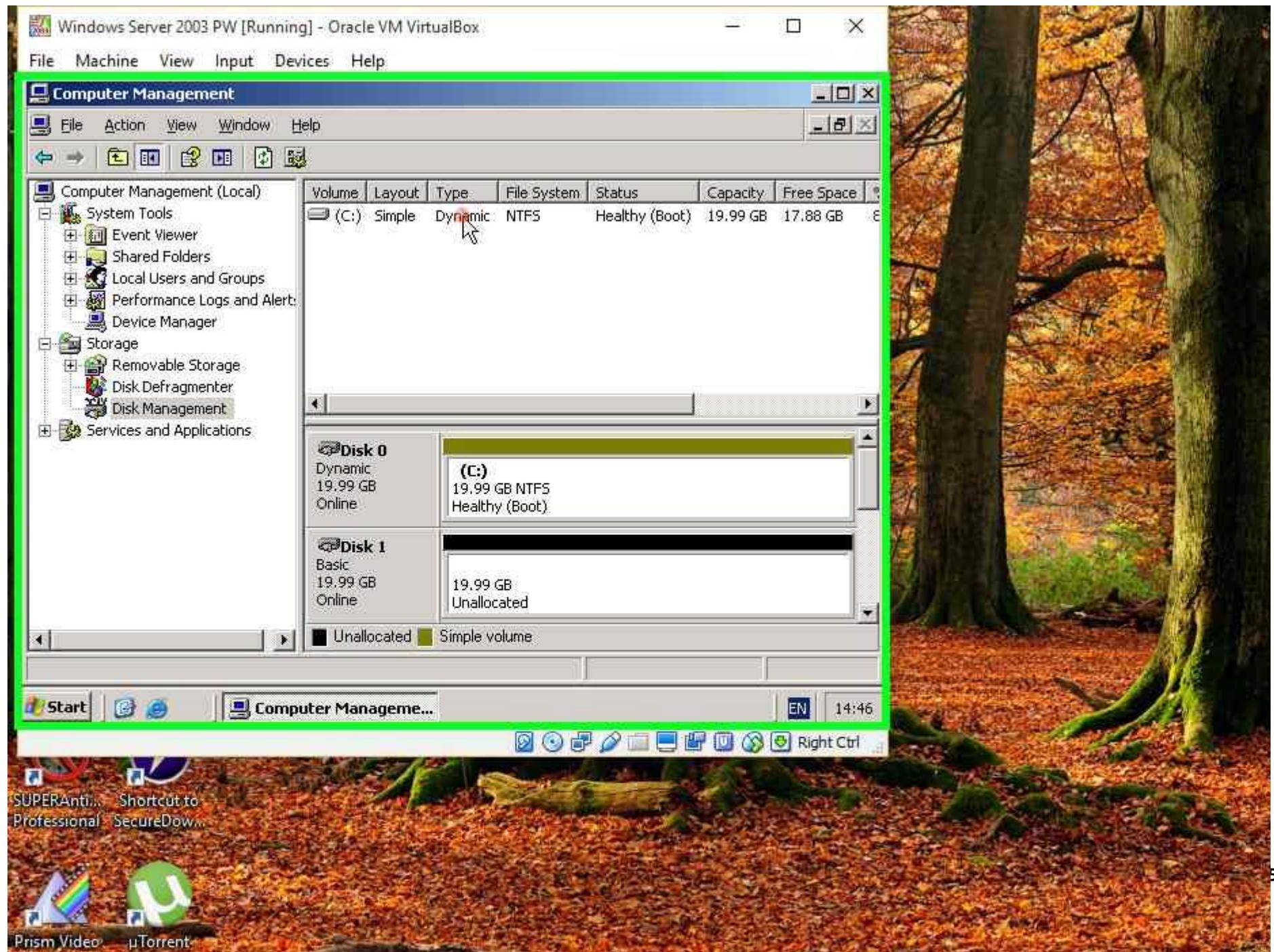


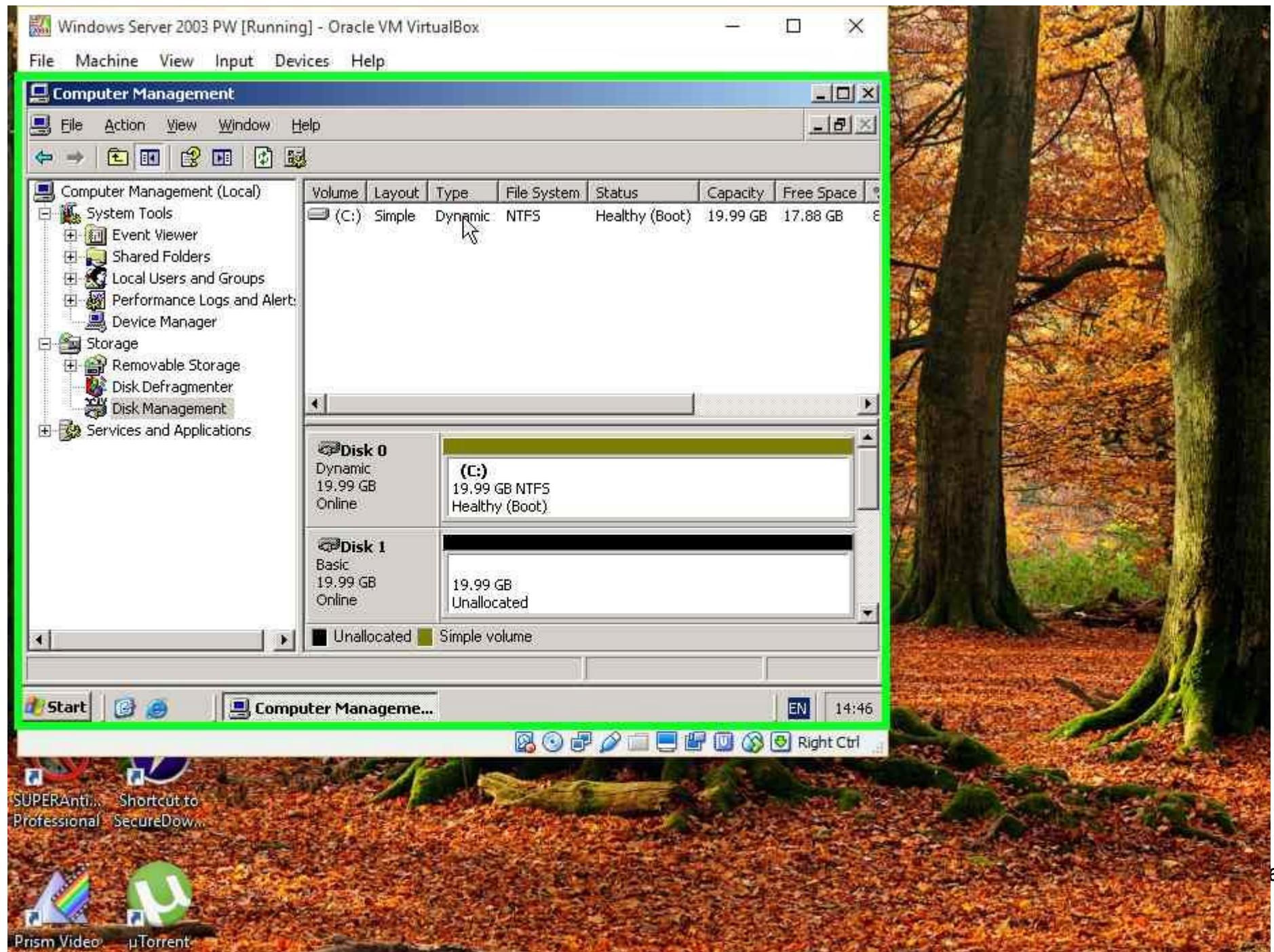


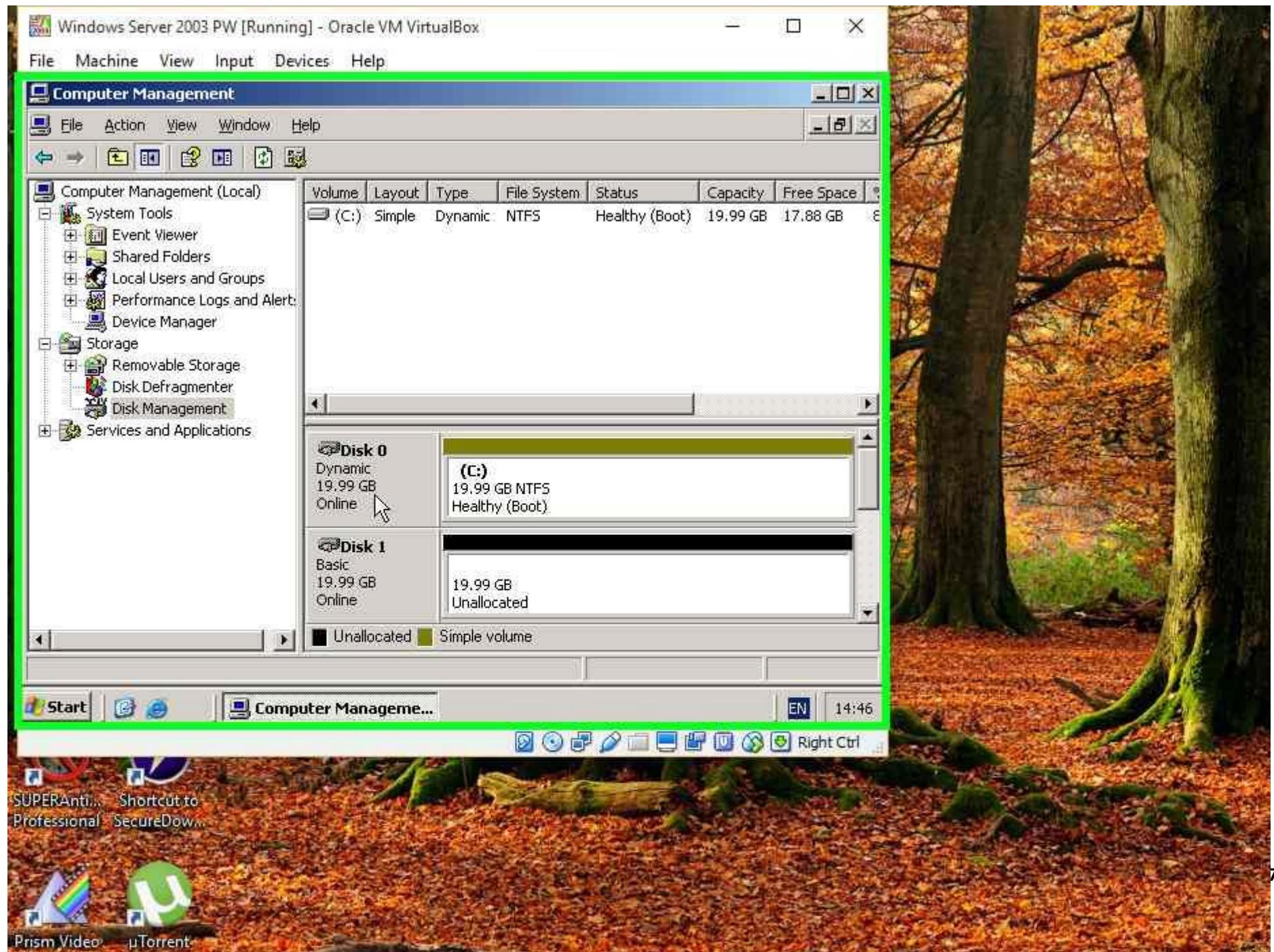


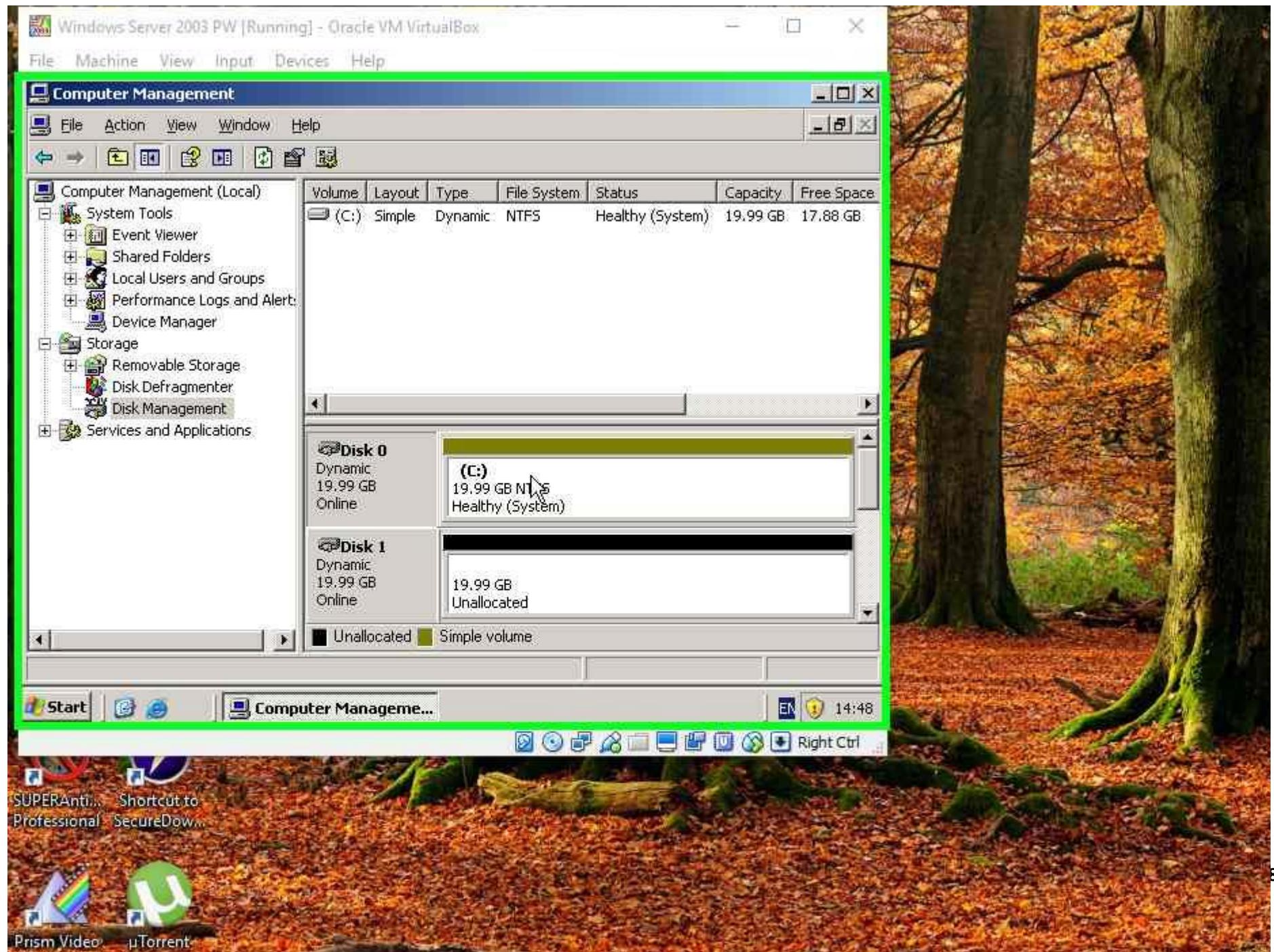


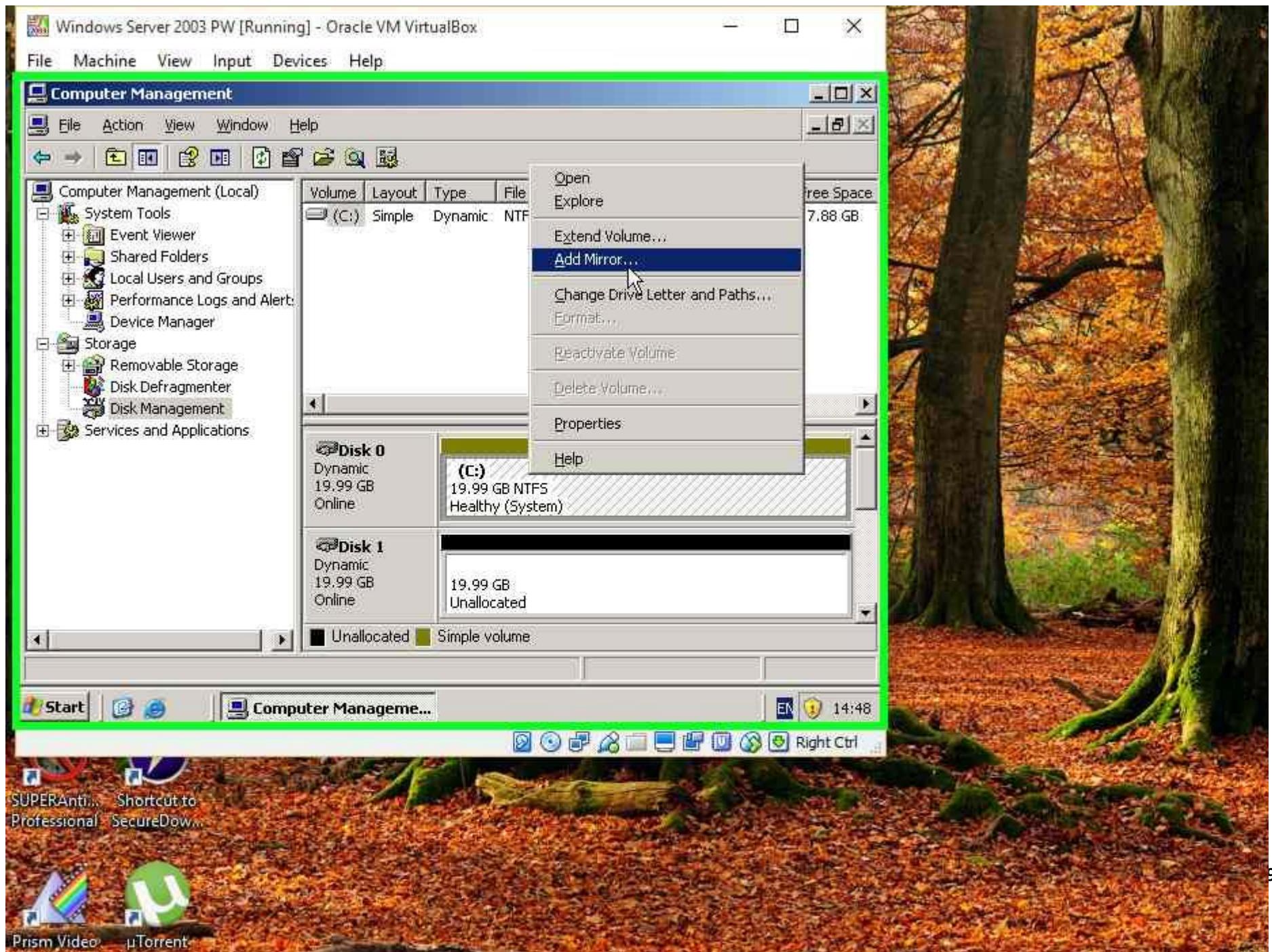


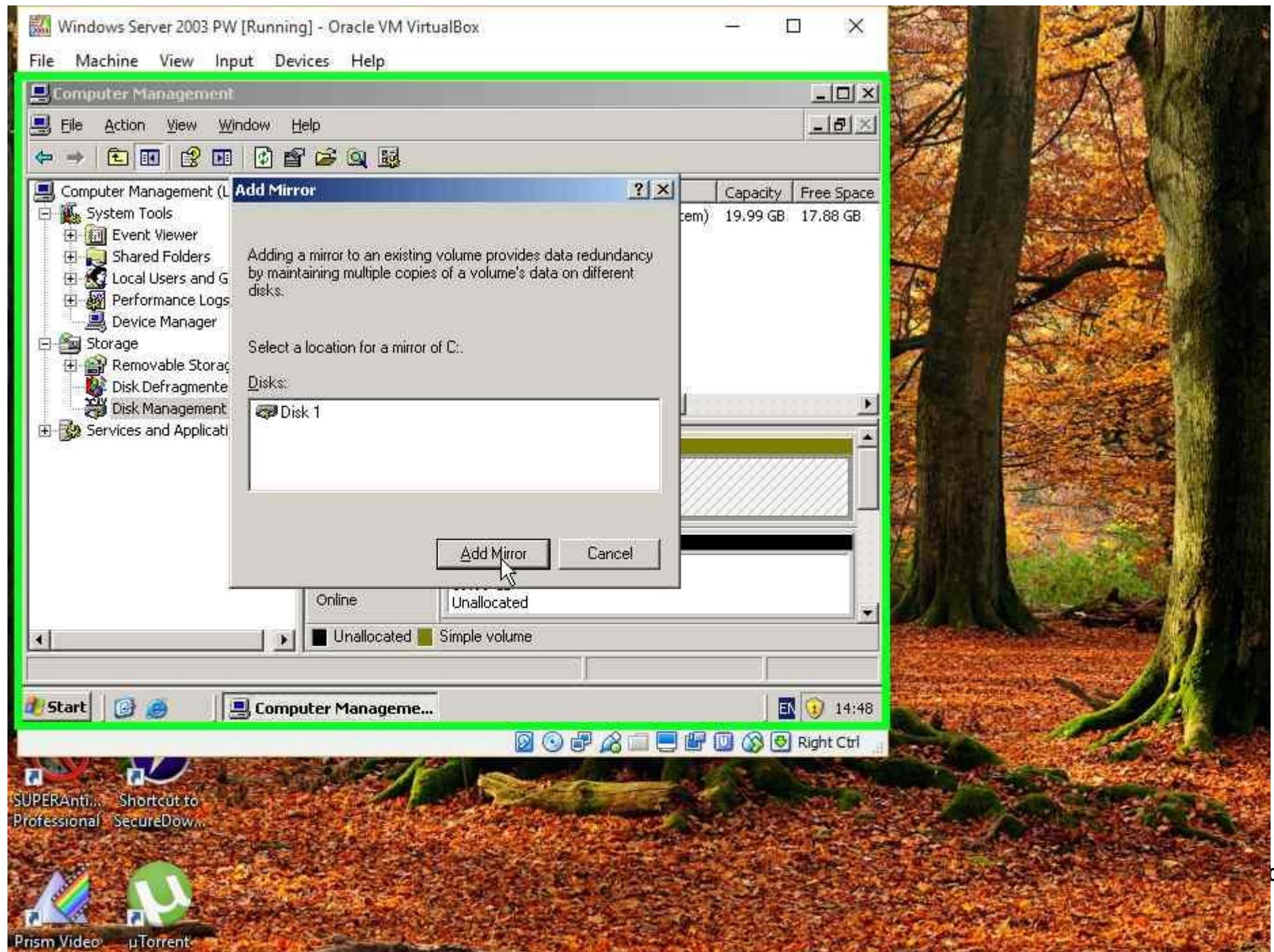


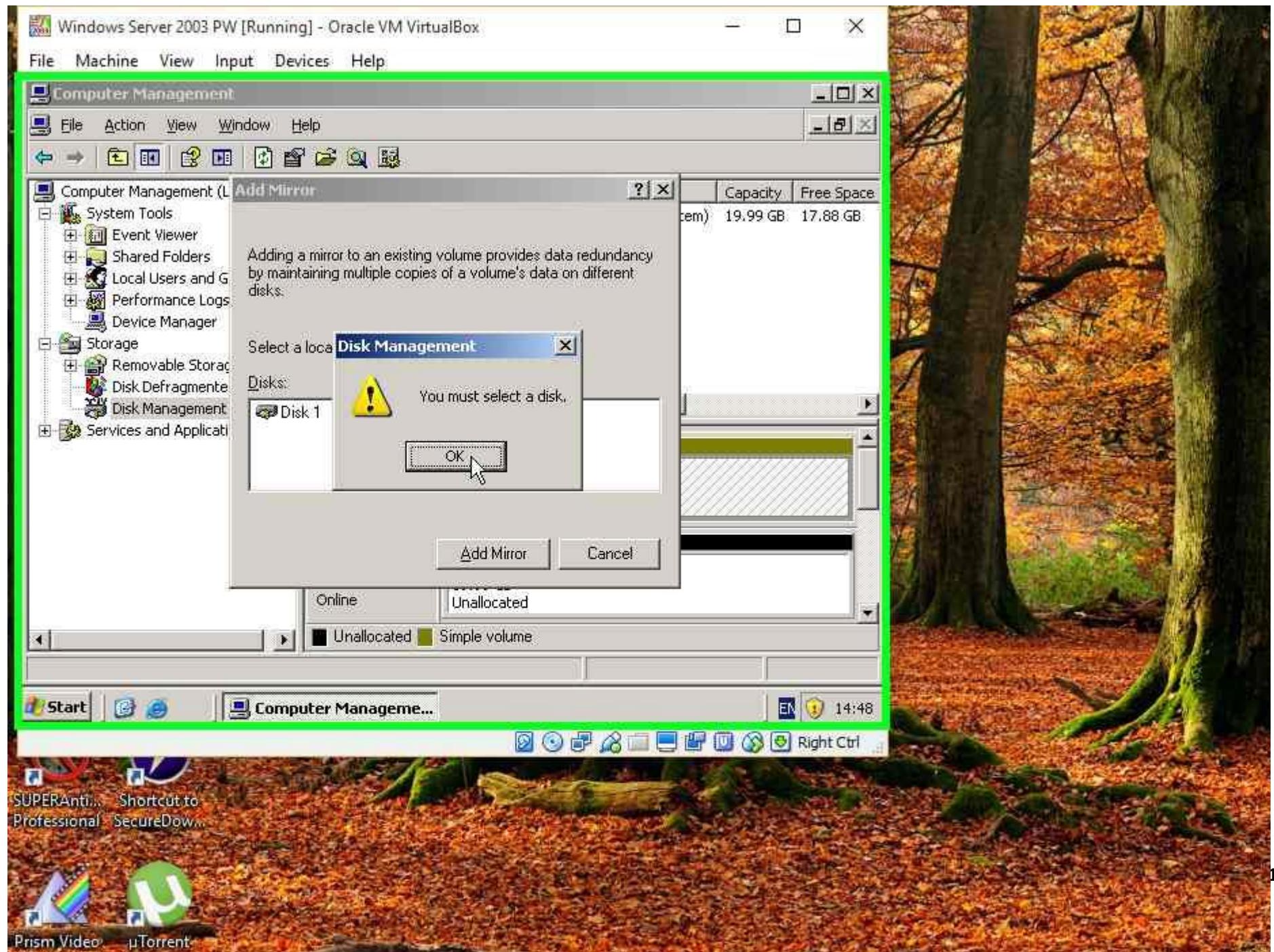


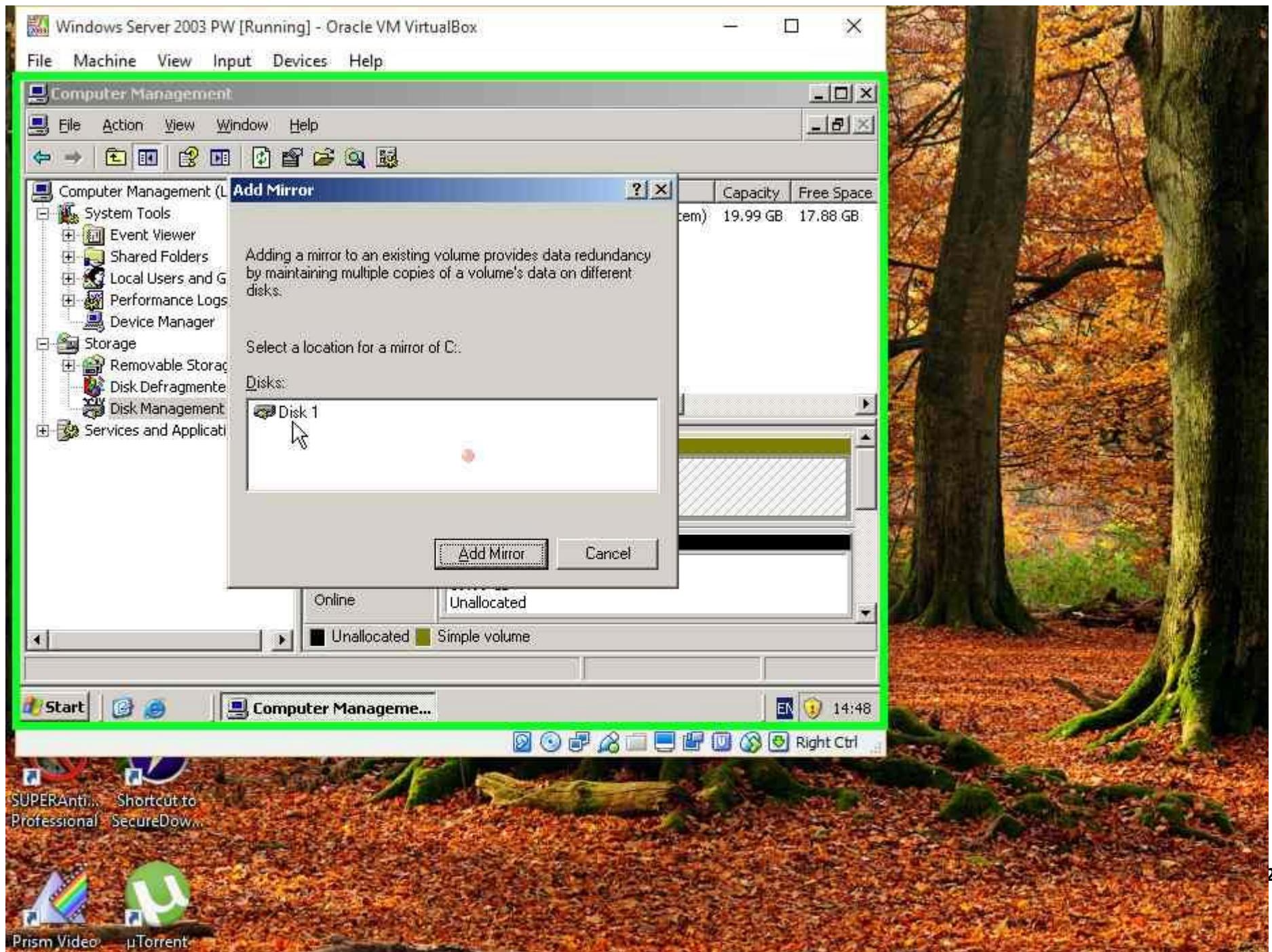


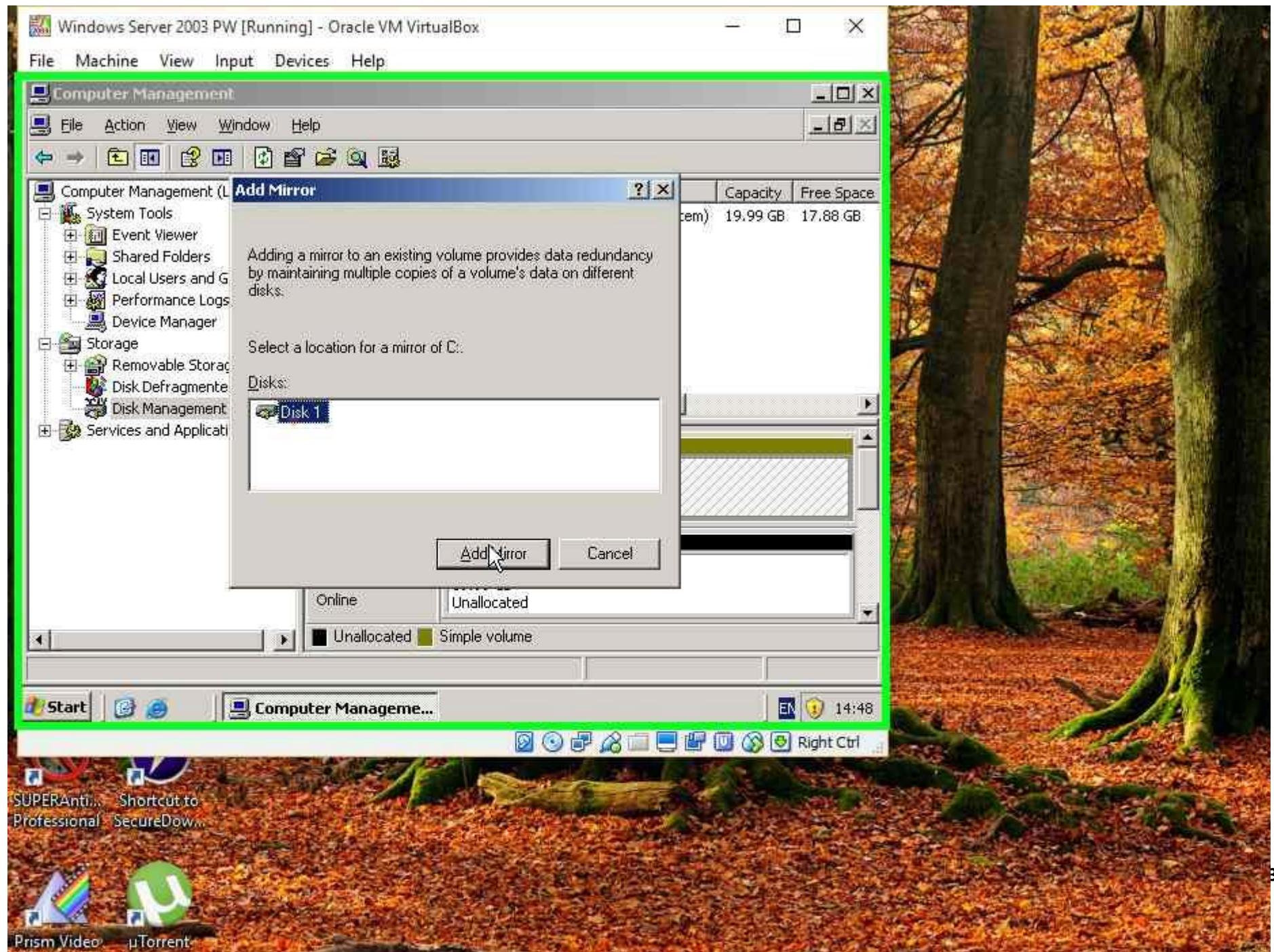


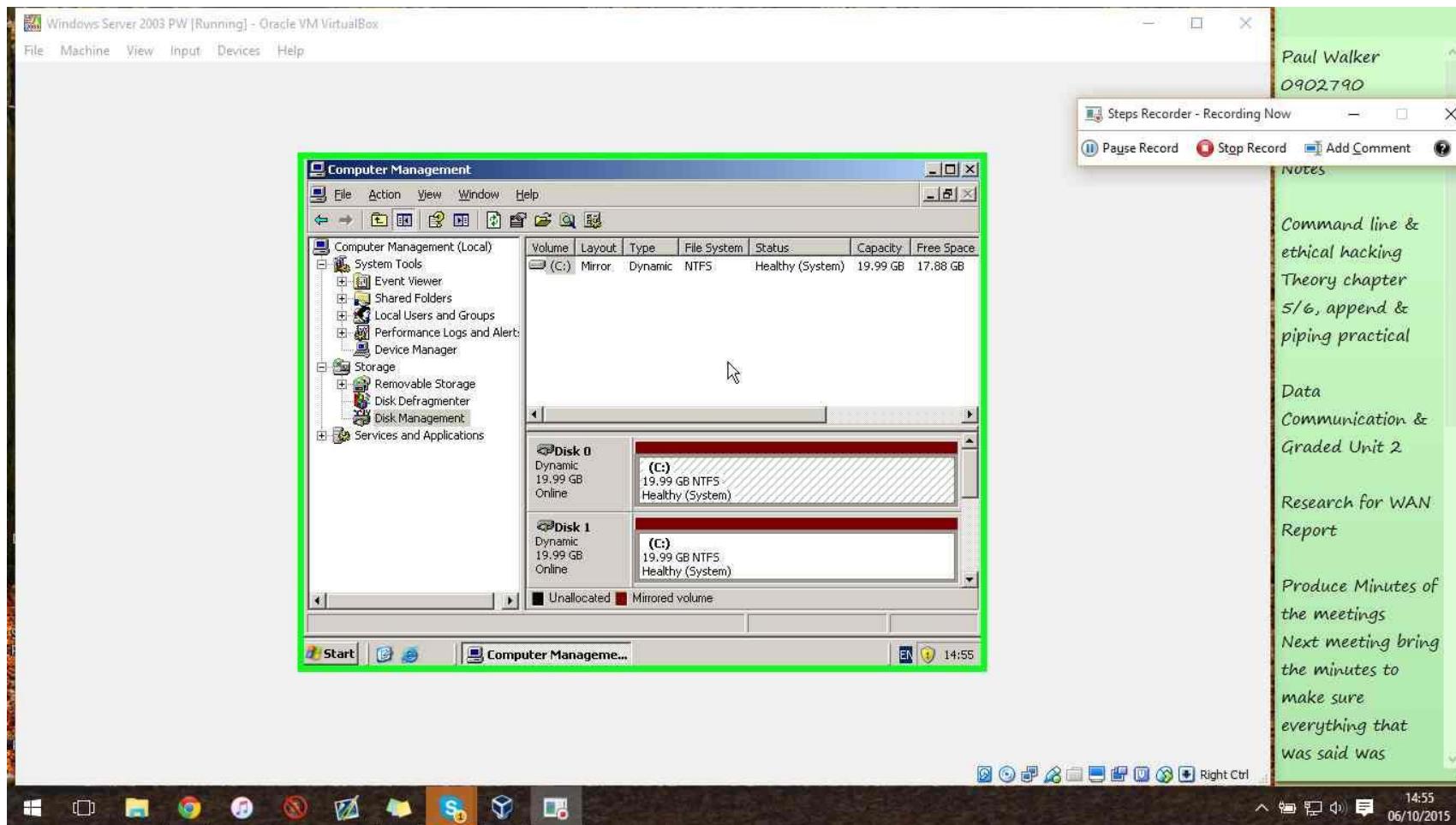












## Managing the Project – Appendices

Appendix 140: e-portfolio

# DEVELOPMENT STAGE PROGRESS

⌚ MAY 13, 2016    🗣 LEAVE A COMMENT    🖊 EDIT

I recorded my progress of the Development stage in the form of a diary which will be inserted into this post. The diary records the details of the tasks i performed over the last three months of the project.

Janaury 20th 2016 -January 26th 2016: I began to research the information required for changes to application software after changes were required to be made which taken a total of 5 days to locate and find the relevant information to process into the next section of the project

January 20th 2016 – March 23rd 2016: During the next 46 days I began the process of installing and deploying the required software for Crichton Memories. This included the operating systems for the client workstations and the server units that will host the vital services the network requires. The installation also included the many applications used by the staff. This stage was one of the largest in the project due to the amount of software required and the methods of deployment.

March 25th 2016 – April 12th 2016: Once the explanation of software and services was explained i moved on to focus on the hardware side of the project. This included installing the servers, router, switches being physically placed into the rack cabinet and client workstations being physically positioned in each department. This section also lightly mentions printers although I went into further detail later on. The cabling and installation was explained forming a full functional physical network.

April 12th 2016 – April 15th 2016: This short section is where I went more in-depth on the printer configurations such as explaining how they are shared and which permissions would be placed on them.

April 15th 2016 – April 21st 2016: In this phase I went more in-depth on how certain features required by the client would work in the network. This included the implementation and explanation of features such as roaming profiles for the ability to use more than one computer in the building, groups and permissions to enforce restrictions on users and the security of the network.

April 22nd – May 13th: The final phase of the project was to test it although many applications couldn't be tested due to inability to obtain the software although I managed to provide write ups and logs of what expected results should be if they were tested.

## Appendix 141: Project Plan

		Task Mode	Task Name	Duration	Start	Finish	Predecessor
1			Planning Stage	101 days	Thu 27/08/15	Thu 14/01/16	
2			Analysis	5 days	Thu 27/08/15	Wed 02/09/15	
3			Problem Analysis	3 days			
4			Complete Analysis	0 days	Thu 03/09/15	Thu 03/09/15	2
5			▲ Aims of the Project	13 days	Wed 02/09/15	Mon 21/09/15	2
6			Benefits	4 days	Wed 02/09/15	Tue 08/09/15	
7			Requirements	4 days	Wed 09/09/15	Mon 14/09/15	6
8			Constraints	9 days	Wed 09/09/15	Mon 21/09/15	6
9			Complete Aims	0 days	Wed 02/09/15	Wed 02/09/15	
10			▲ Requirements & Non Requirements	10 days	Fri 02/10/15	Thu 15/10/15	
11			Requirements	3 days	Fri 02/10/15	Tue 06/10/15	
12			Non Requirements	3 days	Fri 02/10/15	Tue 06/10/15	
13			Identify Constraints	2 days	Fri 02/10/15	Mon 05/10/15	
14			Complete Requirements & Non Requirements	0 days	Fri 02/10/15	Fri 02/10/15	
15			▲ Key Factors	15 days	Mon 02/11/15	Fri 20/11/15	
16			Hardware	4 days	Mon 02/11/15	Thu 05/11/15	
17			Software	4 days	Mon 02/11/15	Thu 05/11/15	
18			Design	3 days	Mon 02/11/15	Wed 04/11/15	
19			Security	3 days	Mon 02/11/15	Wed 04/11/15	
20			Complete Key Factors	0 days	Mon 02/11/15	Mon 02/11/15	
21			▲ Resources	14 days	Sat 21/11/15	Wed 09/12/15	

22		Procedures	2 days	Mon 23/11/15	Tue 24/11/15	
23		Staffing	3 days	Mon 23/11/15	Wed 25/11/15	
24		Equipment	2 days	Mon 23/11/15	Tue 24/11/15	
25		Software	2 days	Mon 23/11/15	Tue 24/11/15	
26		Other Resources	2 days	Mon 23/11/15	Tue 24/11/15	
27		Time in Class	1 day	Mon 23/11/15	Mon 23/11/15	
28	☛	▫ Information Resources	4 days	Sat 21/11/15	Wed 25/11/15	
29		Hardware	1 day	Mon 23/11/15	Mon 23/11/15	
30		Software	2 days	Mon 23/11/15	Tue 24/11/15	
31		Online Retailers	2 days	Mon 23/11/15	Tue 24/11/15	
32		Technical	2 days	Mon 23/11/15	Tue 24/11/15	
33		References	2 days	Mon 23/11/15	Tue 24/11/15	
34		Complete Resources	2 days	Mon 23/11/15	Tue 24/11/15	
35	☛	▫ Analysis Approach	7 days	Tue 01/12/15	Wed 09/12/15	
36		Life Development Cycle	3 days	Tue 01/12/15	Thu 03/12/15	
37		eportfolio	7 days	Tue 01/12/15	Wed 09/12/15	
38	☛	▫ Planning Project Plan	26 days	Thu 10/12/15	Thu 14/01/16	
39		Complete Planning Stage	20 days	Thu 10/12/15	Wed 06/01/16	
40	☛	▫ Development Stage	87 days	Fri 15/01/16	Fri 13/05/16	
41	☛	▫ Installation and Configuration	46 days	Wed 20/01/16	Wed 23/03/16	
42		▫ Installation and Configuration	46 days	Wed 20/01/16	Wed 23/03/16	

42			Applications Research	5 days	Wed 20/01/16	Tue 26/01/16	
43			Client Operating System & Applications	10 days	Fri 05/02/16	Thu 18/02/16	
44			Client Operating System	2 days	Fri 19/02/16	Mon 22/02/16	43
45			Word Processing Applications	2 days	Tue 23/02/16	Wed 24/02/16	
46			Video Conferencing	3 days	Thu 25/02/16	Mon 29/02/16	
47			Business Suite	2 days	Tue 01/03/16	Wed 02/03/16	
48			Web Design	1 day	Thu 03/03/16	Thu 03/03/16	
49			Email	1 day	Fri 04/03/16	Fri 04/03/16	
50			Anti-Virus	3 days	Mon 07/03/16	Wed 09/03/16	
51			Server Operating System	5 days	Thu 10/03/16	Wed 16/03/16	
52			Installation of Services	4 days	Fri 18/03/16	Wed 23/03/16	
53			Network Nodes	14 days	Fri 25/03/16	Tue 12/04/16	
54			Server Config	2 days	Fri 25/03/16	Sat 26/03/16	
55			Workstation Config	2 days	Mon 28/03/16	Tue 29/03/16	
56			Router Config	2 days	Thu 31/03/16	Fri 01/04/16	
57			Printer Installation	1 day	Mon 04/04/16	Mon 04/04/16	
58			Switch Config	1 day	Tue 05/04/16	Tue 05/04/16	
59			Cabling	3 days	Wed 06/04/16	Fri 08/04/16	
60			Other Resources	1 day	Mon 11/04/16	Mon 11/04/16	58

61			▪ Printers	4 days	Tue 12/04/16	Fri 15/04/16	
62			Printer Config	3 days	Tue 12/04/16	Thu 14/04/16	
63			▪ Users, Groups and Security	5 days	Fri 15/04/16	Thu 21/04/16	
64			Roaming Profiles	1 day	Fri 15/04/16	Fri 15/04/16	
65			Creating Groups	1 day	Fri 15/04/16	Fri 15/04/16	
66			Creating Home Folders	1 day	Fri 15/04/16	Fri 15/04/16	
67			Creating Quotas	1 day	Fri 15/04/16	Fri 15/04/16	
68			Creating Group Policies	1 day	Mon 18/04/16	Mon 18/04/16	
69			Firewall Setup	1 day	Tue 19/04/16	Tue 19/04/16	
70			MAC Address Filtering	1 day	Tue 19/04/16	Tue 19/04/16	
71			Anti-Virus Config	1 day	Tue 19/04/16	Tue 19/04/16	
72			Backup Schedule & Config	1 day	Wed 20/04/16	Wed 20/04/16	
73			Logon Hours	1 day	Wed 20/04/16	Wed 20/04/16	
74			Access Control Lists	2 days	Wed 20/04/16	Thu 21/04/16	
75			▪ Complete Installation	82 days	Fri 22/01/16	Fri 13/05/16	
76			▪ Testing	15 days	Mon 25/04/16	Fri 13/05/16	
77			Users and Groups	7 days	Mon 25/04/16	Tue 03/05/16	
78			File Structure	7 days	Mon 25/04/16	Tue 03/05/16	
79			Network Access	7 days	Mon 25/04/16	Tue 03/05/16	
80			Software	5 days	Tue 03/05/16	Mon 09/05/16	
81			Security	5 days	Tue 03/05/16	Mon 09/05/16	
82				.	.	.	

81			Security	5 days	Tue 03/05/16	Mon 09/05/16	
82			Complete Test	15 days	Mon 25/04/16	Fri 13/05/16	
83			<b>▪ Evaluation Stage</b>	<b>7 days</b>	<b>Wed 27/04/16</b>	<b>Thu 05/05/16</b>	
84			Outline	7 days	Wed 27/04/16	Thu 05/05/16	
85			Strength and Weaknesses	5 days	Wed 27/04/16	Tue 03/05/16	
86			Recommendations	3 days	Wed 27/04/16	<b>Fri 29/04/16</b>	
87			Modifications	2 days	Wed 27/04/16	Thu 28/04/16	
88			Knowledge Skills	1 day	Wed 27/04/16	Wed 27/04/16	

Appendix 142: Project Plan (Calendar View)

## February 2016

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
01	02	03	04	05	06	07
	Applications Research, 5 days				Client Operating System & Applications, 10 days	
08	09	10	11	12	13	14
		Client Operating System & Applications, 10 days				
15	16	17	18	19	20	21
				Client Operating System, 2 days		
	Client Operating System & Applications, 10 days					
22	23	24	25	26	27	28
Client Operating Syst	Word Processing Applications, 2 days			Video Conferencing , 3 days		
29						
	Video Conferencing ..					

## March 2016

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
	01	02	03	04	05	06
		Business Suite, 2 days		Web Design, 1 day		
07	08	09	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
				Server Config, 2 days		
28	29	30	31			
	Workstation Config, 2 days		Router Config, 2 days			

## April 2016

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
				01	02	03
			Router Config, 2 days			
04	05	06	07	08	09	10
Printer Installation, 1 day						
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	
			Outline, 7 days			
			Strength and Weaknesses, 5 days			
			Recommendations, 3 days			
			Modifications, 2 days			

## May 2016

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
						01
				Outline, 7 days		
				Strength and Weaknesses, 5 days		
02	03	04	05	06	07	08
	Outline, 7 days		/s			
	Strength and Weaknesses, 5 days					
09	10	11	12	13	14	15
	Complete Testing, 15 days					
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

## Appendix 143: Pricing Sheet

	A	B	C	D	E	F	G
1	Requirement	Manufacturer	Model/Version	Amount Required	Price per Item	Total Price	Other Information
2	Software						
6	Client Operating System	Microsoft	Windows 10 Pro	20	N/A	N/A	Included in 365 Package
7	Word Processing	Microsoft	Microsoft Office 365 Business Premium	1	£7.80	N/A	Monthly cost
8	Video Conferencing	Skype	Skype for Business	20	N/A	N/A	Included in 365 Package
9	Business Suite	Pegasus	Opera 3 - Capital Gold Business Pack	1	£1,130	£1,130	
10	Business Suite	Pegasus	Financials Business Accounting Software	1	£0.00	£0.00	Add-on package
11	Business Suite	Pegasus	Supply Chain	1	£0.00	£0.00	Add-on package
12	Business Suite	Pegasus	Business Intelligence	1	£0.00	£0.00	Add-on package
13	Business Suite	Pegasus	Payroll & HR	1	£0.00	£0.00	Add-on package
14	Web Development	Adobe	Dreamweaver CC	1	£22.23	N/A	Monthly cost
15	Business Email	Microsoft	Outlook	20	N/A	N/A	Included in 365 Package
16	Anti-Virus	Symantec	Norton Anti-Virus Small Business	1	£114.99	£114.99	Provides 20 licences, Annual cost
17	Server Operating System	Microsoft	Windows Server 2012 R2	3	N/A	N/A	Included in Server
19	Hardware						
21	Server	DELL	PowerEdge R330 rack server	3	£1,369	£4,106.16	
22	Workstations	DELL	Inspiron 3847	20	£560.99	£11,219.80	
23	Switches	TP LINK	TP Link 48 Port 10/100 Rackmount Switch	5	£77.38	£386.90	
23	Switches	TP LINK	TP Link 48 Port 10/100 Rackmount Switch	5	£77.38	£386.90	
24	Router	Cisco	CISCO 1760 ROUTER - 1*PSU	1	£19.01	£19.01	
25	Printers	Epson	Epson PrecisionCore WorkForce WF-2650WF	5	£60.16	£300.80	
26	Projector	ELEPHAS	ELEPHAS Full Color 130" Portable LED Pico Projector	1	£60.05	£60.05	
27	Patch Panel	???	48 Port 2U Rack Mountable CAT6 Patch Panel	1	£34.99	£34.99	
28	Fan	???	1u 19" Rackmount Cabinet Fan Units	2	£84.00	£201.60	
29	UPS	???	APC Smart-UPS SC 450VA 230V - 1U Rackmount/Tower	2	£183.54	£367.08	
30	Backup Storage	Sony	LTO 4 Tape	3	£16.85	£50.55	
31	Cabinet	???	SR1 42U SERVER RACK 800W x 1200D	1	£610.00	£610.00	