Using the Virtual Desktop to Access SAS at The University of Iowa

In line with an ITS commitment to provide "SAS Anywhere Anytime" service to the University of Iowa community, SAS 9.1 was added to the Citrix/Virtual Desktop lineup in 2003. A Virtual Desktop implementation of the SAS system at the time was somewhat unique to academic institutions and only a few had successfully initiated such a service. The purpose of this document is to provide some basic information about how SAS functions in the virtual environment and the procedures one needs to follow to access SAS from the Virtual Desktop. The statements that appear below were written and contributed by ITS personnel including the Citrix Systems Administrator, Director of Statistical Support, and the Research Information Systems staff.

What is the Virtual Desktop?

The Virtual Desktop is a web-based system which allows users to access a number of software applications from virtually any computer with an Internet connection, on or off campus. The availability of these applications through Virtual Desktop varies according to whether you are using a computer on the University of Iowa campus network or whether you are using a compute from an off-campus location. Due to licensing agreements, some applications are only available when connecting from a computer on the campus network.

The following discussion provides information needed to use the UI Virtual Desktop service. The topics include: (1) an overview of the technology behind Virtual Desktop; (2) a statement about applications available for on and off campus users; (3) instructions for accessing and using Virtual Desktop; (4) best Virtual Desktop setup practices; (5) managing documents from a Virtual Desktop session; (6) common Virtual Desktop issues and troubleshooting information; and (7) frequently asked questions (FAQs) about the Virtual Desktop service.

Virtual Desktop Overview

The Virtual Desktop service is currently powered by Citrix MetaFrame Presentation Server 4.5 -- a technology that allows remote users of virtually any computing platform to connect to Windows applications that are actually installed and running on a remote server.

A client is installed on the user computer that, in effect, remote-controls the application. It sends video, keystrokes and mouse movements back and forth between the client and server to accomplish this. Users of Windows Remote Desktop (Terminal Services) will find many similarities. In fact, Citrix technology is built on top of Terminal Services but offers more advanced features and better performance. Ideally, a Virtual Desktop application should appear to be running on a user's local desktop just as any other installed application would.

Key Features

- **No installation necessary:** Virtual Desktop users can run most of the applications that are available in the ITC labs around campus but from any computer, on-campus or off-campus, with a decent internet connection. The programs are installed on the Virtual Desktop servers so no software needs to be obtained and installed on the client computer except for a small Citrix web client.
- **Access to popular applications from any computer with an internet connection:** Most applications are available from on-campus as well as off-campus. This means students who are home for the holidays, for example, can still access applications they need from any computer that has an internet connection.
- **Web Interface:** The Virtual Desktop web interface provides an easy, centralized portal to connect to all Virtual Desktop applications.
- **Mac users can run Windows applications:** Mac users can run Windows applications from their Mac OS X desktop without having to run Parallels or other PC emulation software.
- **Mapped Printers and Drives:** Depending on which Citrix client you are using, your local drives and printers are seamlessly made accessible within the Virtual Desktop session.
- **Security:** Virtual Desktop sessions use 40 bit encryption for the actual session and the Virtual Desktop Web Interface uses 128 bit (SSL) encryption for passing user credentials to the Virtual Desktop servers.
- **Performance:** Virtual Desktop sessions use the more advanced Citrix ICA compression algorithm which offers a significant performance gain over Terminal Services/Remote Desktop.
- **Published Applications:** Unlike Remote Desktop, Virtual Desktop sessions present you with only the desired application that you may minimize and resize as you wish on your own desktop. With Remote Desktop, you must connect to an entire remote Windows desktop.
- **Better performance from high-load applications:** Certain statistical analysis applications which exert very high processing loads can perform much better on a Virtual Desktop server because they employ server-class hardware.

Applications Available Through Virtual Desktop

The Virtual Desktop currently provides access to over 50 software packages. In addition to SAS, the list includes other statistical packages -- SPSS, STATA, Minitab and statistical specialty packages like *R*. To see a list of all available software and their restrictions for on and off campus use, go to the following link http://helpdesk.its.uiowa.edu/virtualdesktop/applications.htm.

Virtual Desktop Connection Instructions

In a Virtual Desktop application, you are working in an application that is running on a server. Therefore, the hard drives in your client computer are located across the network from that server. To be able to save a document to your local hard drive, you must map a network drive in the Virtual Desktop session so it is accessible from the Virtual Desktop application. This is considered a "mapped drive".

Which Citrix Clients Support Mapped Drives?

To connect to the Virtual Desktop one must first install a Citrix Web Client on the computer you are using. Three web clients are available: Windows, Macintosh, and Java.

All three of the supported Citrix Clients support drive mapping, though it is handled in different ways, depending on which client you are using.

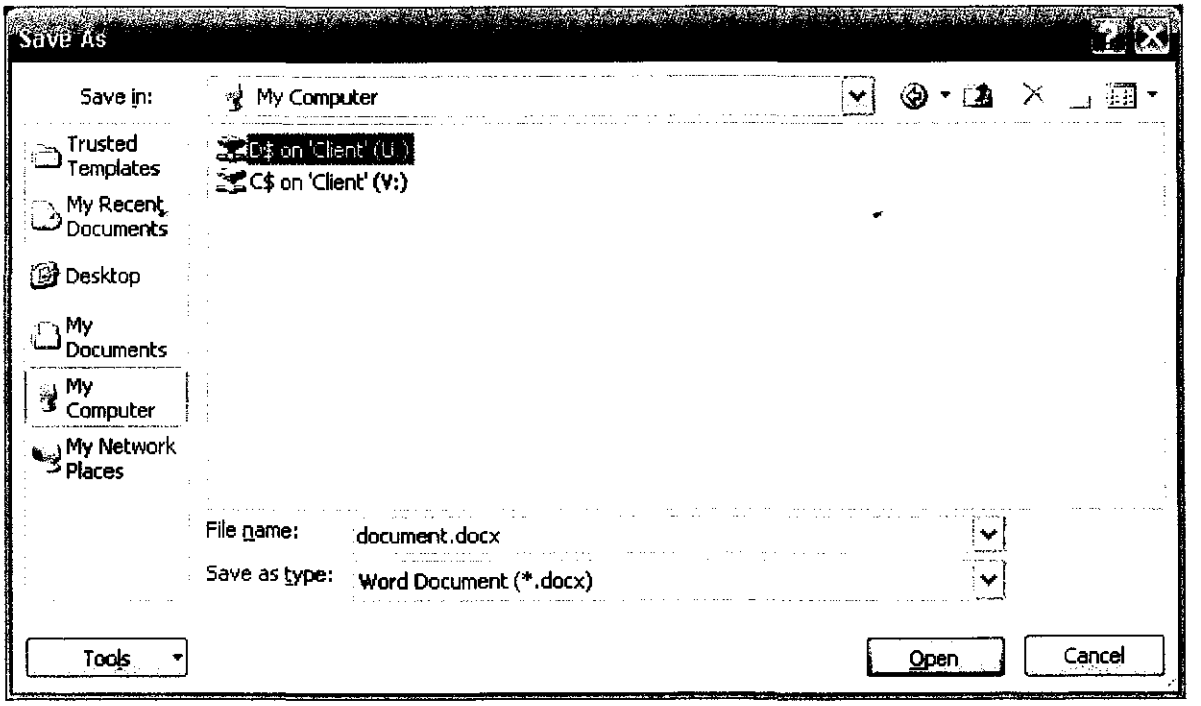
- **Citrix Web Client on a Windows PC:** All of your local hard drives are automatically mapped without any configuration.
- **Citrix Client for Mac OS X:** By default, your "Home Folder" is mapped to the Virtual Desktop session. On a Mac, your home folder is "\Users\ {Your Username}" on your Mac hard drive. For instructions on how to map other drives, see the instructions for configuring default settings for the Citrix Client for Mac OS X at

  http://helpdesk.its.uiowa.edu/virtualdesktop/instructions/osx/configure_mac_osx_defaults.htm.

- **Citrix Client for Java:** The Java client also automatically creates a mapped drive to your home folder in Mac OS X. (The home folder on a Windows PC would be your "My Documents" folder if you are running the Java client on a Windows machine.)

How Do I Know Which Drive is My Local Hard Drive in a Virtual Desktop Session?

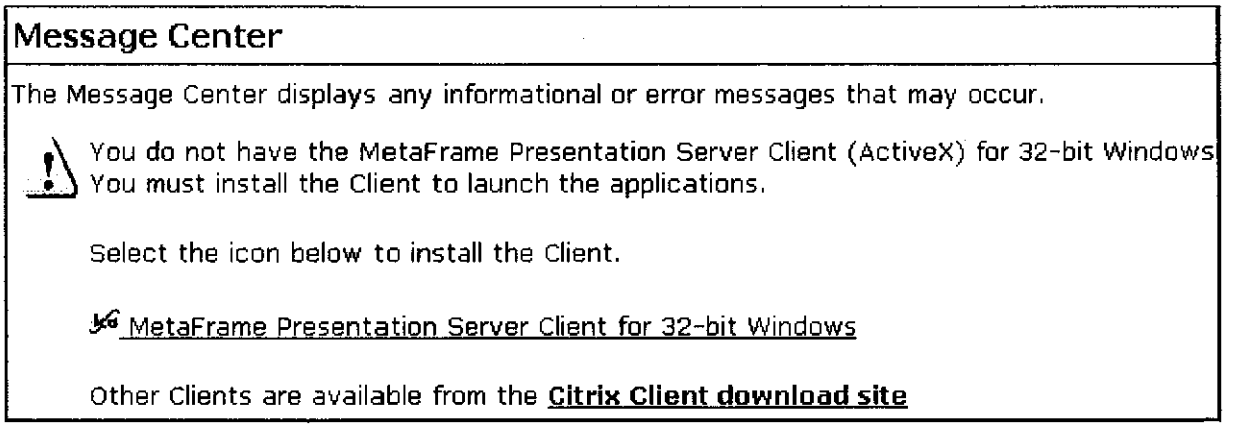
Typically, when you go to save a document in a Virtual Desktop application, your mapped drives will appear as shown in the image below. **"C$ on 'Client' (V:)"** means that your local (C:) drive is being mapped as the (V:) drive in the Virtual Desktop session. (The reason they are not mapped as the same drive letter (C:), (D:), etc. is to avoid conflicts with the actual hard drives that are local to the server, which are already named drives C: and D:)



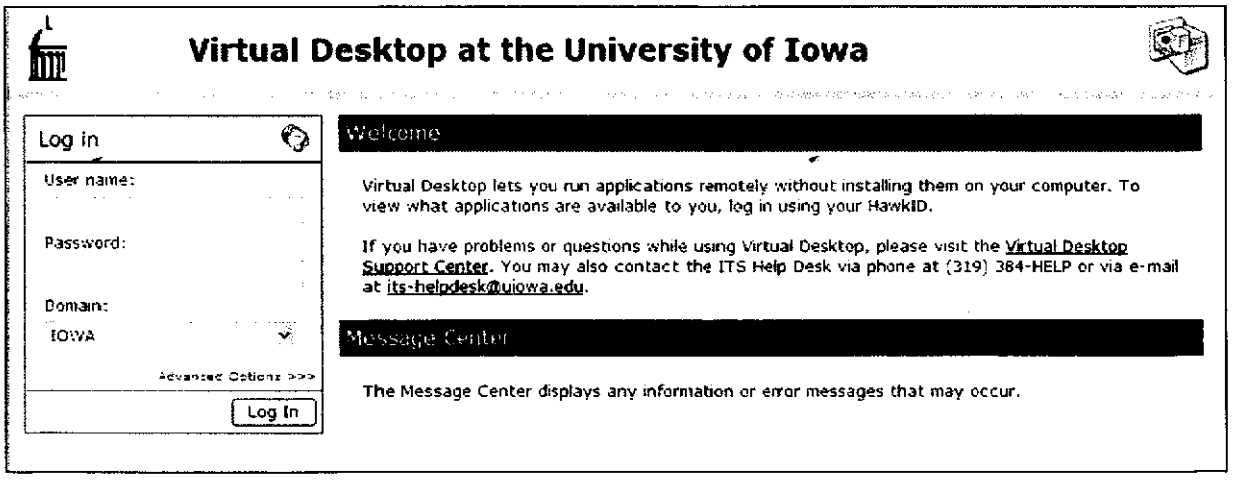
Establishing a PC or Windows Connection

To connect to Virtual Desktop using a PC, you need to install the Citrix web client for the PC. Once installed, the client will automatically map your local drives and printers so they are available to you while in the Virtual Desktop session.

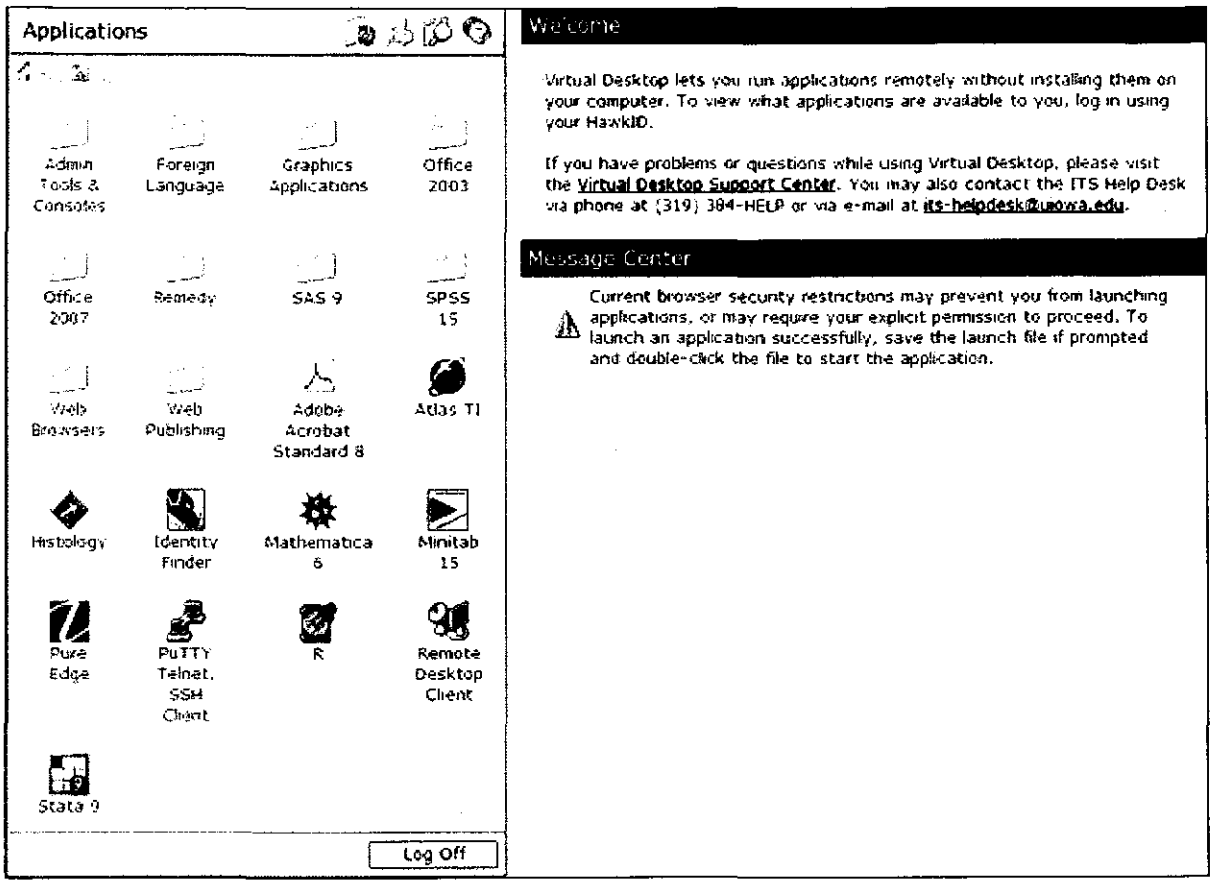
1. On a Windows PC, go to http://virtualdesktop.uiowa.edu using Internet Explorer for the web interface for Virtual Desktop.
2. To connect to Virtual Desktop-delivered applications, you will need to install a Citrix client. (This only needs to be done the first time you connect.) In the lower right corner of the page, there will be a message that directs you to download and install the web client for Citrix. After you click the link that says "**MetaFrame Presentation Server Client for 32-bit Windows**" and install it, you may be told you need to restart your browser but that isn't necessary.



3. Go back to the page and log in with your HawkID and password.



4. An area will appear with all of the published software that you have rights to use.



5. If you click on one of the icons, a number of connection dialog windows will come up and the program will start in its own window. This window will appear and behave in the same way as any of the other windows on your desktop. You may minimize or resize them.

6. **IMPORTANT!** When connected to a Virtual Desktop session, the server automatically maps drives back to the local hard drives (in the computer physically in front of you) so that you can open and save files locally while in the Virtual Desktop session. The first time you try to open or save a document, you will be asked for permission to access your local hard drive. When you allow this, it is only for the current session, unless you choose **"Don't ask me again"**. Once the drives are mapped, your local drives will appear as **"C$ on Client (C:\)"** and **"D$ on Client (D:/)"** and so on in the Virtual Desktop session.

7. When you close the window hosted in a Virtual Desktop session, you are still authenticated to the Virtual Desktop server. If you wish to connect to another Virtual Desktop application, you may do so at this time. Otherwise, click **"log out"** in the web interface.

Troubleshooting Virtual Desktop Connections

This discussion applies to the Windows, Macintosh, and Java Citrix/Virtual Desktop clients. Below is a list of common troubleshooting procedures that is not meant to be exhaustive.

General Virtual Desktop Issues

- None yet available: See client-specific sections below.

Citrix Client for Java Specific Issues

- Graphics Problems with the Citrix Client for Java and Dual Monitors

Citrix Web Client (PC Users) Specific Issues

- Troubleshooting Citrix File Security

Citrix Client for Mac OS X Specific Issues

- None yet available

Virtual Desktop Best Practices

Research Information Systems (RIS) offers the following tips and best practices to help make your experience using Virtual Desktop more enjoyable. A few of these suggestions most relevant to SAS users are listed below:

1. Don't forget to install the Citrix client software.
2. Customize the Citrix user interface to suit your connection method.
    - Go to http://virtualdesktop.uiowa.edu/ , but don't logon yet.
    - Select "Advanced Options" under the Domain drop-down box
    - Select the Window Size and Performance that suits your need

    or
    - Logon to http://virtualdesktop.uiowa.edu/
    - Select the Settings icon (to the right of Applications at the top)
    - Select Connection Preferences
    - Select the Window Size and Performance that suits your need
    - Select OK
3. Create shortcuts on your computer to the Citrix applications you use most often.
    - Logon to http://virtualdesktop.uiowa.edu/
    - Right-click on the application you want to use
    - Select "Save Target As" (or "Save Link As" in Firefox)
    - Save the file to your desktop or other location
    - Double-click on the file you just saved to launch your application
4. Consider creating a shortcut to the Citrix desktop. This will look and feel more like your work computer.
    - Logon to http://virtualdesktop.uiowa.edu/

- Select the folder called "Admin Tools/Consoles"
- Right-click on the Desktop icon
- Select "Save Target As" (or "Save Link As" in Firefox)
- Save the file to your desktop or other location
- Double-click on the file you just saved to launch your desktop

5. Use your local web browser instead of the browser included with Citrix.
6. Do not grant Citrix access to you local files unless you really need to. When you are prompted with the Client File Security window, select "No Access".

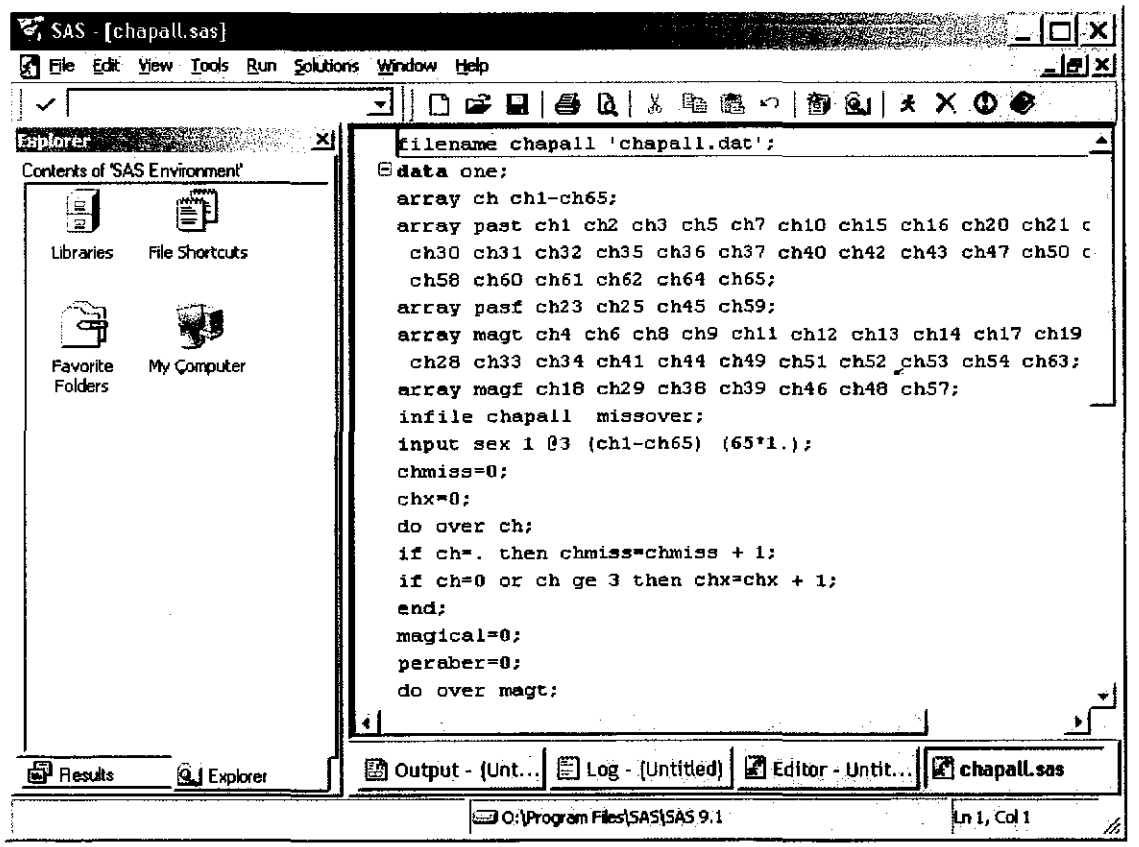
Working with SAS in a Virtual Desktop Session

SAS should function the same way on the Virtual Desktop as it does in a normal stand alone Windows environment with a few minor exceptions. The only important difference concerns how files are referenced from within the SAS program code. This is due to a difference between where the files are physically located.

Referencing Files Within a SAS Program

Because the Virtual Desktop references file paths differently than the Windows operating system, you must either keep supporting data files (.DAT) in the same folder as the SAS program file (.SAS) OR provide the full file path when referencing them.

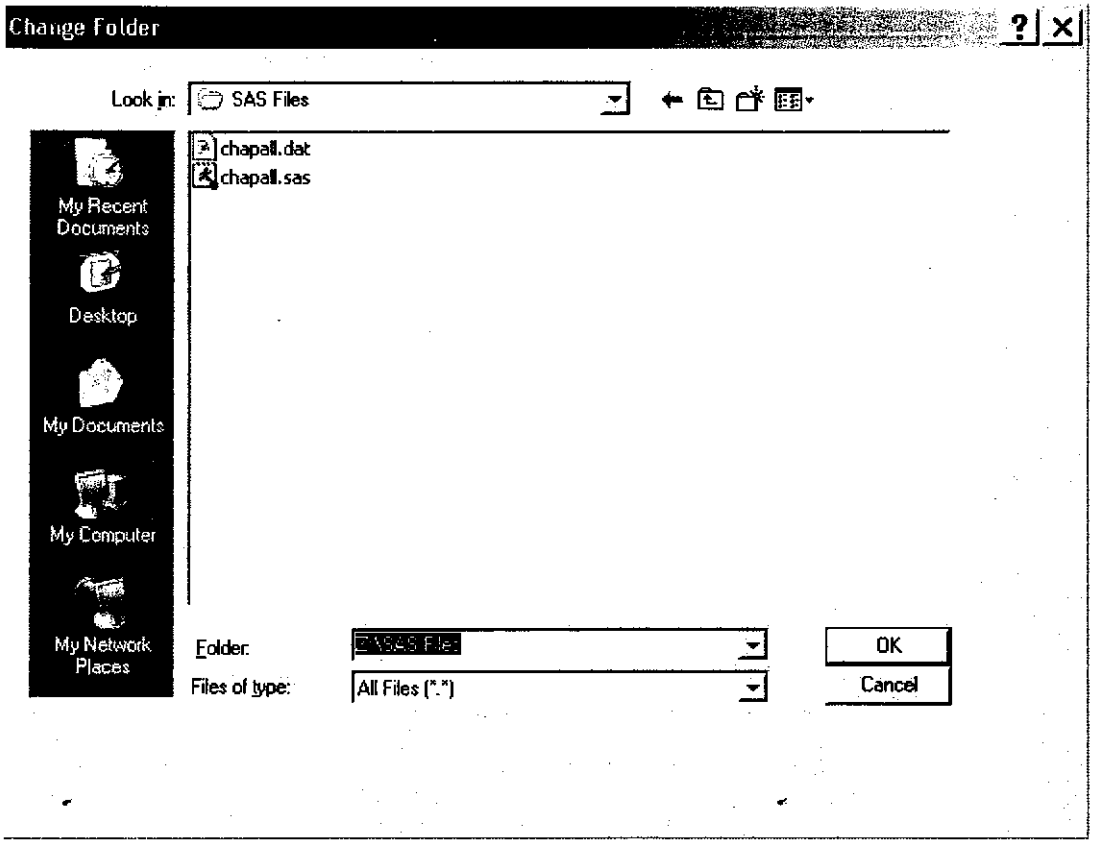
EXAMPLE - Consider the following SAS program code:



On the first line of the program, the data file **chapall.dat** is referenced without a path. SAS will look for **chapall.dat** in the path shown at the very bottom of the SAS window. (**O:\Program Files\SAS\SAS 9.1** in this case). This is called the **Initial Folder**. When this program is run, an error will be reported in the program log stating that the file **chapall.dat** cannot be found unless the file is actually located in the **O:\Program Files\SAS\SAS 9.1**

This can be remedied in one of two ways:

1. Change the **Initial folder** to the directory where all of your SAS files are stored. This will generally be **Z:\SAS Files.** To change the path, simply double-click on the area where the Initial folder is displayed and change the path. (See image below.)



2. Change the **Filename** statement so that it gives the entire path to **chapall.dat**, which would be **Z:\SAS Files\chapall.dat**. In many cases, this will not be practical since SAS data will generally reside in the same place and the problem can be easily remedied by using the previous solution. However, this method provides a way to reference data or other supporting files which are stored in directories other than the **Initial folder.**

   For example, if you are running the SAS program file located in the **Initial Folder** at **Z:\SAS Files\SASProgram.sas** and a needed data file is stored at **Z:\SAS Files\research\data\SASData.dat**, you would change the filename statement as follows:

   filename SASData 'SASData.dat';

   becomes

   filename SASData 'Z:\SASFiles\research\data\SASData.dat';

Virtual Desktop Frequently Asked Questions

Who can use Virtual Desktop?
The service is open to students, faculty and staff of the University of Iowa. For more information, ask your departmental computing consultant/administrator.

What is the difference between Citrix MetaFrame and Microsoft Remote Desktop?
Remote Desktop allows users to connect to the entire desktop of a remote Windows computer from other Windows computers or Mac OS X. The experience is much like maintaining two separate computers, each with their own data, settings and installed programs. Citrix MetaFrame, which is the technology that the Virtual Desktop service is based on, provides better security and simplifies the experience for the end user. For more information on the features and benefits of Virtual Desktop (Citrix), click here.

Which Citrix client should I use?
On a Windows PC, you should use the Citrix Web Client. On a Mac, there are two available options, the Citrix Client for Mac OS X or the Citrix Client for Java.

What types of applications can be accessed over Virtual Desktop?
Virtual Desktop can run most any application that will run under Windows 2000/XP/2003. See the list of available applications at http://helpdesk.its.uiowa.edu/virtualdesktop/applications.htm.

Are Virtual Desktop applications available through ResNet?
Yes, Virtual Desktop is available through ResNet. As part of the University's on-campus network, ResNet users have access to all Virtual Desktop applications.

If I am using e-mail via Virtual Desktop and open a document that uses a program that I don't have rights to, what happens?
If you are using an e-mail program or web browser via Virtual Desktop and click on a link for a document that opens with another program like Microsoft Word that you don't have rights to use via Citrix, the document will open in a Virtual Desktop session as long as the necessary application exists on the server. Permissions must be granted to users to use each application via Virtual Desktop but if they open a program indirectly, like opening a Word document as an e-mail attachment, it will open in the Virtual Desktop session provided that Word is installed on the Virtual Desktop server.

What is the best way to connect to Virtual Desktop?
The easiest way to connect to Virtual Desktop is by using the Virtual Desktop Web Interface. When users log into the web interface, it displays icons for all of the applications to which they have been given permissions.

What is the address of the Virtual Desktop web interface?
http://virtualdesktop.uiowa.edu

What username/password should I use to authenticate to Virtual Desktop?
You should use your HawkID or Active Directory account (they are the same) to connect to Virtual Desktop.

Why is my Virtual Desktop window freezing?
The reasons that your Virtual Desktop-delivered application could be freezing up are numerous. The most likely cause is that your internet connection has either dropped all together or has drastically slowed so that your Citrix client can't receive video data from the Virtual Desktop server. The best course of action is to disconnect and reconnect to the internet.

Can I use Virtual Desktop to connect to a remote application using a dial-up connection?
Yes. Virtual Desktop is based on Citrix technology which uses advanced compression technology to minimize bandwidth usage, especially as compared to a Remote Desktop connection. Running a Virtual

Desktop-delivered application over a slow dial-up connection is very possible though slow compared to a broadband connection.

Are Virtual Desktop connections encrypted?
Yes. 40 bit encryption is used for the actually Virtual Desktop connection and 128 bit encryption (SSL) is used on the Virtual Desktop Web Interface to transfer your user ID and password.

Can I use Mozilla Firefox to connect to the Virtual Desktop Web Interface?
On a PC: Yes.
On a Mac with the Java client: Yes BUT you may see some degradation in image quality. If this is causing issues, you may want to try the Safari browser instead.

What do you mean by printer or drive redirection?
One of the important features of Virtual Desktop is printer/drive redirection. This feature allows you to access your locally installed devices while in a Virtual Desktop-delivered application, which you are actually "remote controlling". Virtual Desktop "maps" a path in your Virtual Desktop session back to your local device so they are accessible during that session.

Why does printing or saving something over a Virtual Desktop connection take so long?
When you are working on a document in Microsoft Word via Virtual Desktop, for example, the application is running on the remote Virtual Desktop server. When you save that document back to your hard drive, it is more like downloading it from the internet, which essentially, is what you are doing. This will take much longer than if you were saving it from the RAM on your local machine to your local hard drive because the document never leaves the inside of your computer. The same rules apply to printing to a mapped printer.

How do my local drives appear when in a Virtual Desktop session?
Check out page 3 of this document.