DB2 9 Database Administration Workshop for Windows
(Course code CF23)

Lab Setup Guide
ERC 8.3

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Purpose

This Lab Setup Guide provides directions for installing, preparing, and verifying the lab hardware and software in preparation for conducting a class of course CF23. The Requirements sections of this document may also be used to determine the specific hardware and software needed to conduct a class.
1. Overview of the Build Process

This Lab Setup Guide provides directions for installing, preparing, and verifying the lab hardware and software in preparation for teaching course CF28 v5, based on DB2 9.1. The Requirements sections of this document may also be used to determine the specific hardware and software needed to conduct a class.

The Server machine for this class is a Linux server provided as a VMware Image. The intent is that each student has their own Linux server running as a virtual machine on the same hardware as the Windows host system. To run this successfully, you need to have a minimum of 1 GB of RAM memory.

Alternatively, if you have local hardware that can be used as a dedicated Linux or UNIX server, the lab exercises can be run on that hardware. Thus the exercises are written for a multi-user Linux/UNIX environment, but would normally be used just for a single user VMware image. Hence, we have retained instructions for AIX, Sun Solaris, and HP-UX UNIX servers where appropriate (generally for creation of users and groups and similar administrative activity). No provision is being made currently for using a server at the IBM Learning Services Atlanta site - and, if you wanted to attempt that, you must have sufficiently fast network access. Taking an approach other than the provided VMware Linux Image (available in English language) would require that you obtain DB2 9.1 installation software to build and test a local server prior to scheduling the class to ensure that there are no hardware issues with your server.

This Lab Setup Guide provides complete information for setting up a VMware Images for Linux or setting up a VMware Image for Windows. The Linux setup is described below in detail, as you may not be familiar with setting up Linux whether in a VMware Image environment or otherwise. The section on setting up a VMware Image for a Windows implementation of DB2 9.1 is also provided, but in less detail. Separating these two gives the students the possibility to choose which environment they want to use for their exercises.

Required

Thus, to build a VMware Linux Image for a full classroom environment, you should read:

- Some Best Practices for Creating and Using VMware Images
- Gathering Necessary DB2 9.1 Installation Files
- Building a RedHat Enterprise Linux 4 (RHEL) VMware Image
- Further Installation on Any Linux Platform
- Setting up the Windows hosting system

If you prefer to use a Novell SuSE base for your VMware Linux Image, you can use the following instead of the setup for RedHat Linux:

- Building a SuSE Linux Enterprise Server 10 (SLES 10) VMware Image
Optional

If you intend to provide a total Windows environment for students who wish to use just Windows, then you need also:

- Building a Windows 2000 Pro VMware Image for DB2 9.1

You should read the directions on how this would work as part of an overall configuration under the heading **Setting up the Windows hosting system** (page 19).
2. Requirements

Hardware

When using the VMware Linux Image running on a Windows host, the minimal hardware is:

- Pentium processor (1 GHz or better)
- 1 GB local RAM memory (more is desirable)
- 20 GB available disk

If you intend to run both a Windows VMware image and a Linux VMware image on each student workstation, you need to have either more physical memory (1 GB to 2 GB of RAM memory). You can adjust down the memory requirements on the images (Linux images will possibly run with 384 KB of local memory each).

DHCP allocation of IP addresses is desirable as otherwise you should convert the Network Connection of the images from Bridged to NAT.

Software

The software requirements for the each host system (= student workstation) include:

- **VMware Player** (obtainable from [www.vmware.com/download/player](http://www.vmware.com/download/player)).
- **putty** (obtainable from [www.chiark.greenend.org.uk/~sgtatham/putty/download.html](http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html))
- **filezilla** (obtainable from [filezilla.sourceforge.net](http://filezilla.sourceforge.net))

Note that VMware Player is used to run VMware images on the student machines. This is a free download. The various VMware Server packages should not be used anywhere.

To build VMware images, you need to have a license for VMware Workstation 5.5.0 (and then upgrade to 5.5.2). The list price for VMware Workstation 5.5 is under US$200. You can obtain a 30-day trial image and use that to build your image.

If you do not have VMware Workstation 5.5, you may have success building a VMware image without the VMware Workstation software - either a licensed version or a 30-day trial - as some have been successful doing so with just VMware Player and starting from an empty VMware SCSI disk image:

VMWare Player Image Creation

An online .vmx file builder

How to create virtual machines using VMware Player
[http://www.lorenzoferrara.net/old-site/blog/pivot/entry.php?id=73](http://www.lorenzoferrara.net/old-site/blog/pivot/entry.php?id=73)
In addition to the necessary VMware Workstation 5.5 software, you should have **WinZip 10** (for uncompressing installation files and compressing your final VMware images), **TextPad 4**, and CD/DVD burner software, such as **Nero Ultimate 7**. And, of course, a CD/DVD burner - preferably DVD burner, either internal or external - to burn / transfer images.
3. Some **Best Practices** for Creating and Using VMware Images

The following best practices will result in a more usable VMware image:

1. Put notes on the opening page for each VMware image that have the following information minimally:
   - Virtual hardware configuration: Disk size, recommended virtual memory OS configuration, any *non-normal* hardware
   - Passwords

2. After downloading the software for installation (for Linux, generally in the form of .tar or .gz files), gather all files into one directory and burn to a single DVD ISO image file (or to a CD ISO image file, if less than 700 MB). The ISO image file that you burn - rather than physical CDs/DVDs - is easier to use than physical media and will enable faster installation.

   For Linux installations, the files should remain in their original formats (.tar, .gz) rather than expanded in a Windows directory system, as Linux will otherwise have difficulty using them. For Windows installations, however, expansion should be performed with WinZip and the resultant directories burned to CDs/DVDs.

3. If you are installing from disk rather than from a mounted ISO-file/CD/DVD, remove the installation file as soon as possible. This will allow the disk space occupied to be reused and thereby minimize the total size of the VMware image.

4. When the image has been fully built and configured, perform the following steps before releasing it for use:
   - Defragment all drives (Windows only)
   - Review settings for production use: for example, memory use
   - Clone (so that the published image is minimal size)
   - Zip with WinZip 9+ & Split the zipped file (**Actions > Split**) to fit on DVDs - maximum of 4.5 GB per disk - if the image will not fit on a single-sided DVD

   The size of the VMware image determines the number of DVDs to store, copy, distribute, and eventually copy to the student PCs in the classroom. Smaller/fewer is definitely better.
4. Gathering Necessary DB2 9.1 Installation Files

The following files are available for installing DB2 9.1 on Linux (your filenames may be different):

- DB2_Enterprise_Svr_Linux_x86.tar (the only one that you must install - the others are optional)
- DB2_Enterp_Svr_CPU_Activation.zip
- DB2_Info_Center_V91_Linux_x86_x86-64.tar
- db2_v9_doce.tar.gz
- DB2_National_Lang_v91_Linux_x86.tar
- C947VML.tar (DB2 Embedded Application Server and Applications - Web Administration tools)
- C947XML.tar (DB2 Developer Workbench V9.1 for Linux)

For the installation process within a VMware Linux image, burn these - as they are - to a single DVD ISO image. The expansion is best done within Linux itself once the files are copied to /tmp from which the installation is generally performed.

If you are intending to build a DB2 9.1 on Windows image, the files are:

- DB2_Enterprise_Svr_Ed_Windows_x86.exe (the only one that you must install - the others are optional)
- DB2_Enterp_Svr_CPU_Activation.zip (same file as used to activate the Linux server)
- DB2_Info_Center_V91_Win_x86_x86-64.exe
- DB2_Dev_Workbench_V91_Win_x86.exe
- DB2_Client_W indows_x86.exe (included in the ESE server file, but needed if you want only the client software and not the server)

Obviously, not all these are needed to install DB2 9.1 into a VMware Windows image.

For the installation process within a VMware Windows image, first expand these files into directories on the machine where you performed the download, and then burn the expanded directories (plus the original files) to a single DVD ISO image. This will provide you with the maximum flexibility when you install into the VMware Windows image - you do not need to expand on the VM and hence you have space in the VMware image (but, of course, if you decided to load the unexpanded images, you should delete the file once you have installed the software).
5. Building a RedHat Enterprise Linux 4 (RHEL) VMware Image

Requirements for Building the Image

- VMware Workstation 5
  - RedHat Enterprise Linux ISO Images\(^1\) (or CDs), for example:
    - RHEL4-U4-i386-ES-disc1.iso
    - RHEL4-U4-i386-ES-disc2.iso
    - RHEL4-U4-i386-ES-disc3.iso
    - RHEL4-U4-i386-ES-disc4.iso
    - Md5sum.out (optional, verification)
- PC running Windows
  - 1 GB+ memory
  - 20 GB available disk (minimally)
- Recommended
  - NAS / USB attached storage (for example, 250 GB USB external drive)
  - DVD burner (or networking to a PC with a DVD burner)

Requirements for Running the Image

- VMware Player running on Windows / Linux
- Preferably 1 GB+ memory (but minimally 768 MB)

Building the VMware Image

1. Start a new VMware image (RHEL4). Store in a folder, such as:
   C:\My Virtual Machines\RHEL4
2. Set characteristics of VMware image:
   - Memory for this virtual machine: **512 MB**
   - Use bridged networking
   - I/O adapter type: **SCSI Adapter - LSI Logic**
   - Create New Virtual Disk
   - Virtual Disk Type: **SCSI**
   - Disk capacity: 8 GB (but do not allocate all now, and do not split into 2 GB chunks)
   - Disk file name: **RHEL4**

---

\(^1\) RHEL and SLES ISO image files can be obtained from https://ftp3.linux.ibm.com for registered and approved IBM employees. These ISO image files cannot be distributed or provided to anyone outside IBM. For those without access to these ISO images, the equivalent open source RedHat Fedora 5 and OpenSuSE 10 versions of Linux can be used instead with little loss in functionality.
The final Linux image will probably be less than 4 GB and will fit on one DVD. Since we allow for more disk space, this image is suitable for other purposes. Once an image is build you are able to add additional disks or CD/DVD drives at any time with the full VMware Workstation package. By selecting a total disk capacity of 8 GB, you are not allocating all the space now - VMware Workstation/Player will allocate space as needed from the host operating system up to this limit.

3. Make notes into the Notes section on the VMware Workstation main page for characteristics of your build as the system is built, for example:
   - Root password: ibm2blue

4. In building the image you need the RHEL4 images and thus you should choose to use one of the following approaches:
   - CDs or DVD in the physical drive of the machine (requires that you burn actual CDs or DVDs from the ISO images of the RHEL4 software).
   - Click CD-ROM (1:0) and set Connection to Use ISO image. This virtual drive approach is generally the most convenient since it does not require burning the RHEL4 images to actual CDs.

Load the first CD into the physical drive or the virtual drive at this time as we are about the boot our virtual machine to install Linux.

5. Click Start this virtual machine.

You will see RHEL4 start up in character mode: 640x480 (you will adjust this later). On the bottom of the screen, you will see the warning note: "You do not have VMware Tools installed" (you will install these tools once Linux is completely installed).

You will see the early stages of the Linux boot. You do not need to take any actions.

You will have the choice to test the CD media (real or virtual) for integrity before installation proceeds (or select Skip). The first time that you install RHEL4, you should choose OK and go through the testing sequence (once for each CD) - but remember when you have finished to have CD#1 back in the CD drive for the actual installation.

To release your cursor from the VMware Workstation window anytime, press CTRL + Alt simultaneously.

6. When satisfied that you have valid, tested media, select Continue (use the Tab key to alternate between Test and Continue).

Booting continues, and then you will be presented with a GUI interface to make your installation choices.

7. Click Next and then successively make your selections:
   - Language Selection: English
   - Keyboard Configuration: U.S. English
   - Disk Partitioning: Automatic Partitioning (most efficient for our needs particularly as we have only one virtual 8 GB disk drive [sda] assigned)
8. **Warning:** The partition table on device sda is unreadable. To create new partitions it must be initialized, causing the loss of ALL DATA on this drive.

*This operation will override any previous installation choice about which drives to ignore.*

Would you like to initialize this drive, erasing ALL DATA?

Click **Yes**.

Remember that you are only doing this with the virtual machine that you are creating (the up-to-8 GB of disk that you have allocated to your VM) - and you are not formatting your real world disk drive.

*I want to have automatic partitioning: Remove all partitions on this system.*

Click **Next**.

9. **Warning:** You have chosen to remove all partitions (ALL DATA) on the following drives: /dev/sda.

Are you sure you want to do this?

Click **Yes**. Then, **Next** on each of the following two screens.

10. On **Network Configuration**, set the hostname manually to **classroom-rhel4** or something similar. Click **Next**.

11. On **Firewall Configuration**, select **Enable Firewall** and allow access to **Remote Login (SSH)**, **Web Server (HTTP, HTTPS)**, and **File Transfer (FTP)**. Leave SELinux as **Active**. Click **Next**.

12. On **Additional Language Support**, check any languages that you wish installed. Click **Next**.

13. On **Time Zone Selection**, select your local time zone. Read the notes and select **System Clock uses UTC**. Click **Next**.

14. On **Set Root Password**, enter the password **ibm2blue** (default for IBM Information Management classrooms) in both spots. Click **Next**.

15. On **Package Installation Defaults**, select **Customize software packages to be installed** (to select a precise set of packages and thereby minimize the size of the VMware image). Click **Next**.

16. We recommend the following additional packages:
   - Editors
   - Graphical Internet
   - FTP Server
   - Legacy Network Servers (and click **Details** to add also: **rsh-server, telnet-server**)
   - Development Tools
   - System Tools
17. Click **Next** until the installation process starts. You will need all 4 CDs during the upcoming installation.

    When you need to change CDs, click the CD icon (bottom right corner of the Window frame.

18. When installation is complete, the system will reboot and you should login as root.

    The installation currently should occupy just under 3 GB for the disk files and 512 MB for an external virtual memory for VMware itself (= size of memory requested).

**Post-installation handling**

19. When the Linux system comes up again, you will have to complete some final configuration steps:

    - License Agreement
    - Date and Time: *Set as appropriate*
    - Display: *Set to 800x600 (you will later change to 1024x768)*
    - Red Hat Login: Skip registration
    - System User: Student / ibm2blue
    - Sound Card: *Test your sound card*
    - Additional CDs: *None*

20. You will probably find a red exclamation point near the top-right of your window. Click this to bring up the Red Hat Network Alert Notification Tool. You can only use the facilities here if you have a RedHat Network Subscription. If you have a subscription, follow the directions given; if not, you will not be able to use this icon (or click Exit if you click it).

21. To install the VMware Tools, go to your VMware window frame and click **VM > Install VMware Tools** and you will soon see a CD icon placed on your desktop. Click this virtual CD drive to access the contents: VMware Tools as both .rpm and .gz files - you can use either. The simplest approach is to invoke the .rpm file by double-clicking it, but we have found that the .gz approach works better.

    Drag the file to `/tmp`. Open a terminal window and enter the following commands:

    ```
    cd /tmp
    cp /media/cd*/VMware*gz .
    tar zxvf VM*gz
    cd vmware-tools-distrib
    ls -l
    ./vmware-install.pl
    ```

    **Accept all defaults and answer any questions**

    **Select 1024x768 (selection 3)**

    When the installation process is complete, remove the installation files to save disk space:
cd / tmp
rm VM.gz
rm -r vmware-tools-distrib

When finished, the VMware Tools CD should no longer be showing on the desktop. If it is, you may not have installed the tools correctly. In this case, click **VM > Cancel VMware Tools Install** to remove the install icon and return the CD-ROM to normal control.

22. The display size is thus generally changed to 1024x768 during the setup of the VMware Tools. At other times, if you have need, you can change the display to 1024x768 (or another value) by using the Gnome control panel: **Applications > System Settings > Display**: Hardware tab: Monitor type, for example, LCD display 1024x768. The change can only become effective when the system is restarted.

   If you do change display settings other than through the VMware Tools, you can reboot through a terminal window with `shutdown -r 0` or with `reboot`.

23. Continue with the section on **Further Installation on Any Linux Platform** (page 16).
6. Building a SuSE Linux Enterprise Server 10 (SLES 10) VMware Image

Requirements for Building the Image

- VMware Workstation 5
- SLES 10 ISO Images (or CDs), for example:
  - SLES-10-CD-i386-GMC-CD1.iso
  - SLES-10-CD-i386-GMC-CD2.iso
  - SLES-10-CD-i386-GMC-CD3.iso
  - SLES-10-CD-i386-GMC-CD4.iso
  - MD5SUMS (optional, verification)
- Or, the SLES 10 DVD ISO Image (or actual DVD):
  - SLES-10-i386-GMC.iso
- PC running Windows:
  - 1 GB+ memory
  - 20 GB available disk (minimally)
- Recommended:
  - NAS / USB attached storage (for example, 250 GB USB external drive)
  - DVD burner (or networking to a PC with a DVD burner)

Requirements for Running the Image

- VMware Player running on Windows / Linux
- Preferably 1GB+ memory (but minimally 768 MB)

Building the VMware Image

1. Start a new VMware image (SLES10). Store in a folder such as
   C:\My Virtual Machines\SLES10
2. Set characteristics of VMware image:
   - Memory for this virtual machine: 512 MB
   - Use bridged networking
   - I/O adapter type: SCSI Adapter - LSI Logic
   - Create New Virtual Disk
   - Virtual Disk Type: SCSI
   - Disk capacity: 8 GB (but do not allocate all now, and do not split into 2 GB chunks)
3. Make notes into the Notes section on the VMware Workstation main page for characteristics of your build as the system is built, for example:
   - Root password: ibm2blue

4. In building the image, you need the RHEL4 images and thus you should choose to use one of the following approaches:
   - CDs or DVD in the physical drive of the machine (requires that you burn actual CDs or DVDs from the ISO images of the SLES10 software).
   - Click CD-ROM (1:0) and set Connection to Use ISO image. This virtual drive approach is generally the most convenient since it does not require burning the SLES10 images to actual CDs.

Load the first CD into the physical drive or the virtual drive at this time, as we are about the boot our virtual machine to install Linux.

5. Click Start this virtual machine.

You will see SLES10 start up in graphics mode: 800x600 (you will adjust this later). On the bottom of the screen you will see the warning note: "You do not have VMware Tools installed" (you will install these tools once Linux is completely installed).

You will need to click quickly on the window as when you see the startup choices (about 8 of them) you need to quickly use your down arrow to select Installation.

To release your cursor from the VMware Workstation window anytime, press CTRL + Alt simultaneously.

6. Click Next and then successively make your selections (generally the defaults):
   - Language: English (US)
   - License Agreement: Yes
   - Installation Mode: New Installation
   - Clock and Time Zone: as appropriate
   - Installation Settings: use the defaults

7. On Installation Settings, take the defaults but add the following recommended additional Software packages:
   - KDE Desktop Environment for Server
   - File Server
   - Web and LAMP Server
   - Directory Server (LDAP)
   - C/C++ Compiler and Tools

8. Click Accept, and on Confirm Installation, click Install.

9. When you need to change CDs, click the CD icon (bottom right corner of the Window frame).
10. When the installation of the CDs is complete, you need to complete the following configuration items:

- Hostname & Domain: classroom-sles10 ibm.com
- Root Password: ibm2blue
- Network Configuration: Click Firewall SSH port to open
- Test Internet Connection: yes
- Novell Customer Center Configuration: Configure Later
- Users: /etc/passwd

When asked to create a non-root user, create this user as:

- User ID: instructor
- Password: ibm2blue

The user instructor will be used later to ftp files to the system. By default, you cannot FTP to root.

This is followed by Clean Up, a display of the Release Notes, and a display of your Hardware Configuration for you to confirm.

Click Finish to login to the system.

Post-installation handling

11. To install the VMware Tools, go to your VMware window frame and click VM > Install VMware Tools and you will soon see a CD icon placed on your desktop. Click this virtual CD drive to access the contents: VMware Tools as both .rpm and .gz files - you can use either.

The simplest approach is to invoke the .rpm file by double-clicking it, but this appears to be less than always successful. Thus we recommend the .gz approach. Copy the .gz install file from the CD.

```bash
cp /media/cd*/VmwareTools*gz /tmp
cd /tmp
tar zxvf VmwareTools*gz
cd vmware-tools-distrib
ksh ./vmware-install.pl ...and take all the defaults, except screensize (choose 1024x768)
cd /tmp
```

*If you find the CD icon still on your desktop, you may not have installed the VMware tools successfully. In that case, when finished, click VM > Cancel VMware Tools Install to remove the install icon and return the CD-ROM to normal control - and seek help in installing the VMware tools.*

If the VMware Tools are setup correctly, you will be able to have your mouse enter and leave the VM windows without having to press Ctrl+Alt keys. The VMware Tools also enable you to run X-windows applications within the Linux environment without difficulty.

12. If you did not use the VMware Tools setup to set your screen size to 1024x768, change the display to 1024x768 by using the Gnome control panel: Applications > System
Settings > Display: Hardware tab: Monitor type: for example, LCD display 1024x768. The change can only become effective when the system is restarted.

You can reboot through a terminal window with:

```
    shutdown -r 0
```

or with:

```
    reboot
```

13. Continue with the section on Further Installation on Any Linux Platform (page 16).
7. Further Installation on Any Linux Platform

Changes needed to Any Linux Image

1. Allow telnet to the VMware Linux Image. Although SSH is the better and more secure method of connecting to Linux/UNIX, telnet is better known by the students.

On RHEL4 and FC Linux, using a terminal window, change `disable = yes` to `disable = no` in `/etc/xinetd.d/krb5-telnet` and then restart the xinetd daemon:

```
vi /etc/xinetd.d/krb-telnet      ... and make changes
/etc/init.d/xinetd restart
```

You also need to open up the firewall for telnet. Thus, on RHEL4 and FC Linux, using the gnome GUI interface, go to Applications > System Settings > Security Level > Firewall Options (tab) and check Telnet and click OK. (If the Security Level is Firewall Disabled, no action is required.)

2. Allow ftp to the VMware Linux Image.

On RHEL4 and FC Linux, create an entry to start vsftp (Very Secure FTP) in runlevel 5 that will take place on the next boot:

```
cd /etc/rc5.d
ln -s ../init.d/vsftpd S57vsftpd
```

3. As root, edit - or create - the file `/etc/sysctl.conf`, and add these Linux kernel parameters:

```
kernel.sysrq=0
kernel.msgmni=1024
kernel.shmmax=268435456
kernel.sem=250 128000 32 512
```

Execute `sysctl -p` to change the parameters dynamically.

4. Packages needed for DB2 v9 and later include:

- pdksh (generally installed on SLES 10 and RHEL4)
- rsh-server (generally not installed)
- openssh (generally installed on SLES 10 and RHEL4)
- openssh-server (generally installed on RHEL4)
- nfs-utils (generally installed on SLES 10 and RHEL4)

You can check whether your installation already has each of these packages installed - one by one - using:

```
rpm -q pkgname
```

You can check on several packages with a common name stem by asking for all rpm's and then filtering the results, for example, for rsh and rsh-server use:
rpm -qa | grep rsh

Many of the packages were installed with the Linux installation process. If the package is not installed, however, you should obtain them from one of the following and then install:

- ISO CDs used for the install (for RHEL4: Applications > System Settings > Add/Remove Applications; for SLES10: Computer >> System > Install Software)
- RPM repositories and search sites, such as: rpmfind.net (best accessed with MSIE, rather than Firefox browser)
- The vendor Web sites (www.redhat.com, www.novell.com)
- RPMs for Fedora Core 5 can be found at http://download.fedora.redhat.com/pub/fedora/linux/core/updates/5/i386/
- Other Web sites, such as: rpm.pbone.net

Some packages have dependences (other packages that must be installed first). The rpm install process will stop if there are dependencies that must be but are not installed.

5. Disable access control so that graphics clients can connect from any host, including the local host itself:

   xhost +

6. Close down your VMware Linux image:

   halt

With the VM not running, open the .vmx file on the Windows host operating system with a text editor (that is, not Notepad), such as TextPad. Add one extra line to the configuration:

   tools.syncTime="true"

This will ensure synchronization of the VMware Image with the host operating system. Otherwise, the clock in the VM will tend to drift slower.

7. By now, you will have built a base Linux image. You should clone it (VM > Clone: ... From Current State ... Create a Full Clone). This will allow you to build other images from the clone from this point on. You may want to create clones at other times as "savepoints" in your building process.

The cloning process builds a complete copy of your base system. This copy occupies less space than the original as it has not yet been used and hence no overlay space has been acquired yet. Thus you should make the following changes to your original copy (designated as your working image) - rather than the clone copy - and, when you are finished completely, you should create a full clone again to build a reference copy at that stage.
Installing DB2 v9.1 on your VMware Linux Image

1. Copy the DB2 9.1 install tar-file from the CD to the `/tmp` directory on Linux - note the two spaces in the command.
   
   `cp /media/cd*/DB2_* /tmp`

2. Expand the DB2 install tar-file:
   
   `tar xvf DB2_Ent*gz`

3. Start the install process:
   
   `ksh ./db2setup`

4. Click **Install a Product**. You will have three choices:
   
   - DB2 Enterprise Server Edition
   - DB2 Client
   - DB2 Runtime Client

   Select the first of these and click **Install New** to open the 14-part installation process for the DB2 ESE server.

   You probably will want to select a **default install** and choose to create a single partition default instance. You will need to set passwords - use `ibm2blue`.

   **For Custom installs**, you will choose your own settings. Thus, these suggestions are just that, suggestions.

   Select **Custom Install**. In Step 5, select **Server Support** (add checkmark) and **Client Support** (add second checkmark).

   In Step 5, select all those languages that you are likely to be using (important for international classes mainly) - selecting all languages requires about 140 MB additional disk space. Generally, English will be sufficient - and note, if you are going to install languages other than English, you will need the National Language CD (copy to the .tar file to `/tmp/NLS` and expand with `tar xvf`).

   In Step 8 (DAS user), keep the default users dasusr1 and dasadm1 and use `ibm2blue` as the password. In Step 9, do not create a DB2 instance. In step 10, choose **Do not set up your DB2 server to send notifications at this time**.

5. Then, according to your needs, you may wish to set up the DB2 Info Center (separate CD) and/or DB2 Developers Workbench (separate CD). These are best copied to separate directories within `/tmp` (for example, `/tmp/IC` and `/tmp/DWB`), expanded with `tar xvf`, and then installed.

   If you run out of disk as you install, remove what you no longer need (first the tar files that you have already expanded) before going on. Generally, it is best to remove that which you no longer need as you go - and, if so, you will have less to remove later.

   If you are installing the DB2 Info Center (aka doce), the approach is similar to that used for install DB2 itself:

   `cd /tmp/IC`
   
   `./setup`
If you are installing the DB2 Developers Workbench (DWB), the approach is slightly different:

    cd /tmp/DWB
    cd disk1
    cd setup
    ls -l
    ./setup.bin

When you run the DWB install, you should change from the default installation directory to /opt/ibm/DWB/V9.1 (the default is /opt/IBM/DWB/V9.1, but all other products are installed in /opt/ibm rather than /opt/IBM - and Linux is, in general, case sensitive to names).

Note, if you choose to install languages other than English, you will need to provide the language pack also to the installation of DOCE and DWB - or you can skip the installation of the other languages.

6. If you copied the DB2 Activation.zip file in the previous step, you should separate this file and expand it separately.

    cd /tmp
    mkdir DB2-Activation
    mv DB2*Activation* DB2-Activation
    cd DB2-Activation
    unzip *.zip
    cd /tmp

7. After all installation is complete, remove all the installation CD material from your /tmp directory to reduced the overall size of your Linux image:

    cd /tmp
    ls -l
    rm -rf db2
    rm -rf doc
    rm -rf NSL
    rm -rf IC
    rm -rf DWB

and so on, as necessary.

8. Create a .profile file in /etc/skel with the following settings:

```bash
# File /etc/skel/.profile - built for DB2 9.1 classes

stty istrip
# stty intr '^[C' erase '^H'
export USER=`whoami`
export HOSTNAME=`hostname -s`
export PATH=/usr/local/bin:/usr/bin:/usr/X11R6/bin:/usr/ucb:/etc:/bin:.
export PS1='${USER}@${HOSTNAME} ${PWD} > ' export EDITOR=/bin/vi
```
Setting PS1 to this value will cause the user prompt to appear as:

adm51@classroom /home/adm51 >

9. Obtain your IP address.

ifconfig

You will need this for SSH/telnet connections and for FTP purposes.

10. You may wish to clone your system at this time to obtain a VMware Image with just DB2 9.1 installed, but without any specific course installed on it. On the other hand, nothing needed for CF28 will interfere with other courses - and can therefore coexist with other course setups.

Course Specific Changes (CF28)

The following steps are specific to course CF28 and should be applied to your working VMware image:

11. Move your Linux lab files from the courseware to the Linux system. This requires one of the following techniques:

- Copying the Linux lab files to a USB memory stick, then making the USB memory stick available to the Linux VM (relatively easy, and, since the files are small, any memory stick would be sufficient).

- Setting up FTP and then FTPing from the Windows host system to the Linux VMware image (relatively difficult and involving a number of steps) - if you use FileZilla, you will have to have firewalls disabled on your Linux image.

- Setting up an SMB (Samba) connection from the Linux VMware image to the Windows host system (relatively easy and otherwise very similar to FTP - see boxed sample below - SMB is generally installed and running on all Enterprise Linux editions).

- Burning an ISO image of the labs tar file and mounting the ISO image on the VMware Linux image as a CD (or, of course, creating an actual CD) (quite easy).

In all cases, the distributed labs files may be zipped together with both the Windows labs and the Linux labs in the one zip file. The distributed zip file must first be opened to obtain the Linux labs in a .tar file for use on the Linux image. Only the Linux lab’s .tar file is needed.
SAMPLE FTP SESSION (where 192.168.64.129 is the host system IP address, using NAT addressing)

User instructor is used for the FTP as you will not be able to FTP to root
C:\CF28 V 05.0 Labs ZIP>ftp 192.168.64.129
Connected to 192.168.64.129.
220 (vsFTPd 2.0.1)
User (192.168.64.129:(none)): instructor
331 Please specify the password.
Password:
230 Login successful.
ftp> binary
200 Switching to Binary mode.
ftp> put cf285linux.tar
200 PORT command successful. Consider using PASV.
150 Ok to send data.
226 File receive OK.
ftp: 1617920 bytes sent in 0.14Seconds 11556.57Kbytes/sec.
ftp> quit
221 Goodbye.

C:\CF28 V 05.0 Labs ZIP>
Note: In this sample SMB dialog, the get command is used ("get" from the perspective of the Linux server) rather than the put command that you would use with FTP. In this case, think of SMB as a reverse direction FTP using Samba protocols.

The following two steps are not required if you have a running DB2 server and the DAS is already installed.

12. Create a new userID (db2a) for the DB2 Administrative Server (DAS). Set the password for this user to ibm2blue (this is the password that we are using for all created accounts).

   Groupadd db2das
   useradd -g db2das -G users -s /bin/ksh -d /home/db2a -m db2a
   passwd db2a
13. Create the DAS.

```
/opt/ibm/db2/V9.1/bin/dascrt db2a
```

14. Create a directory `/home/CF28` on the Linux file system. Copy the tar file `cf285linux.tar` to this directory - the directions assume that you FTPed this file to `/home/instructor`, but your technique may be different and the location different. Extract all the files from the tar file into the directory.

```
mkdir /home/CF28
cd /home/CF28
cp /home/instructor/cf285linux.tar .
tar xvf cf285linux.tar
ls -l
```

The following scripts are now available in this directory for instructor use (as root):

- `instructor.setup` - Used to create the student user accounts on the system.
- `cleanup.setup` - Used to drop the student instances and remove the student user accounts (not normally needed in reality as you can just use a fresh original copy of the VMware workstation to reestablish everything back to the beginning of class).

**Note:** These scripts are version specific and need to be changed for future versions of DB2. Thus, in creating the scripts for DB2 9.1, the following changes were made:

The text

```
/opt/IBM/db2/V8.2/
```

was changed in 5 places to

```
/opt/ibm/db2/V9.1/
```

The scripts were then repackaged from the `/home/CF28` directory with the commands

```
cd /home/CF28
tar cvf cf285linus.tar ./
```

and then uploaded to the Windows host to build the distributed lab files for this course.

15. Use the `instructor.setup` script to create the single student account needed for the master copy of the VMware Linux image. Since each student will have a separate copy of the image running on his/her workstation, you only need create just one team.

16. You will be prompted to enter a password *twice* for each userid created (there are 5 userids per team). For each userid, set the password to `ibm2blue`.

**Verification of Setup**

1. Change to the `/home` directory and check to see that all userids have been setup.
   
   You should see `userrn`, etc. (where `nn` is 51, ...).
2. Change to the DAS user, db2a (or to user dasusr1 if you used the default installation process), and start the DAS. You may get a message that the DAS is already started.

```
su - dasusr1
db2admin start
db2 terminate
exit
```

or

```
su - db2a
db2admin start
db2 terminate
exit
```

**Finalize Setup**

1. Stop your VMware Image and clone this image. The cloned image is the one that you should provide for student use in the classroom.


TBD
9. Setting up the Windows hosting system

The following setup is required on each student system (assumed to be Windows) where the VMware Linux Image will be run and on the instructor machine.

1. Install **VMware Player** (obtainable from [www.vmware.com/download/player](http://www.vmware.com/download/player)).

2. Install **putty** (obtainable from [www.chiark.greenend.org.uk/~sgtatham/putty/download.html](http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html)) to be able to access the Linux system with SSH (you will not be able to Telnet in successfully).

3. Install **filezilla** (obtainable from [filezilla.sourceforge.net](http://filezilla.sourceforge.net)).

4. Create a directory: `C:\My Virtual Machines`.

5. Create a subdirectory within that directory in that such as RHEL4 (depending on the name and type of your image), for example, `C:\My Virtual Machines\RHEL4`.

6. Copy your built VMware Image into that sub-directory.

7. Start **VMware Player** and use it to open your VMware Linux image.

8. Use the command **ifconfig** on the VMware Linux image in a terminal window to determine the IP address of the Linux server (assuming that DHCP is running and thus your Linux server has been assigned an IP address). Test the connection from the host Windows machine to the Linux server using **putty** to connect to that IP address.

The above is sufficient if you do not wish to connect from your Windows (host system) to the Linux server (VMware image) using the DB2 connect interface (GUI) from the host system. Students can experience the graphic interface by using the Command Center run on the Linux image and connecting locally within the Linux virtual machine to the server.

If you prefer to connect from a Windows-based GUI interface to the DB2 server running on Linux, you have two basic choices:

- Install DB2 Connect on the Windows host - or install a full DB2 Server on the Windows host and use the Command Center to connect locally on the host and remotely to the Linux Server.

- Build a second VMware image that is Windows-based and use it to connect to the VMware image holding the Linux image (requires additional memory on host system, that is, definitely 1 GB+).

The second of these can be understood using this illustration:
Building second VMware image

Windows VMware Image with DB2 Connect (minimally)

GUI

Linux VMware Image with full DB2 ESE Server

SSH (using putty) — command line interface

Host system (Windows)

Updated for DB2 9.1 in August/September 2006

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