Operating System and Database Install Guide

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Overview

This document describes the steps necessary to build an iLabs development machine from **scratch** on the Windows platform. It covers the installation of Windows Server 2003, SQL Server, Visual Studio.NET 2003, and various tools. It also describes the installation of the iLabs source code and the creation of a development project in Visual Studio.NET

Requirements

You should have the following materials on hand before you begin:

- Windows 2003 Server Enterprise Edition CD
 - SATA Drivers on a floppy disk (if your system has a SATA drive)
 - SCSI and/or RAID Drivers on a floppy disk (if applicable to your system)
- SQL Server 2000 CD
- SQL Server 2000 Service Pack 3a CD
- Visual Studio.NET 2003 Professional and Library (6 CDs)
- ILabs Service Broker Code zip files (the latest version can be downloaded from https://wikis.mit.edu/confluence/display/ILAB2/iLab +Downloads)

For those using Windows Server 2008 and SQL Server 2008, there is no specific step by step operating system installation guide. Since there are many variations and versions (Datacenter, Enterprise, Standard, Express, R1 or R2, x86 or x64) it is no longer feasible to write installation guides for each one. Microsoft has install guides for each version on their website. We make the assumption that you have a computer with Windows server 2008 and SQL Server 2008 installed. You will also need to turn on and configure the mail server.

Windows Server 2003

Base Installation

To get a clean install, the partition the operating system resides on will be reformatted. The only way to accomplish this is to boot from an installation CD.

Insert the Windows 2003 CD and restart the computer. Watch for a message at the top of the screen that says "Press any key to boot from CD..". If you miss this message, you will have to turn off the machine and try again. If

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you do not see this message at all, you will have to go into CMOS setup and enable the CD-ROM drive as a boot device.

Note: Do not connect the computer to the network until the very end of the build process. This is to prevent the machine from being hacked until it is properly secured and also to make it easier to reboot with a (temporarily) blank Administrator password.

Once the machine begins to boot, it can take 2 or 3 minutes to load all of the drivers for Windows.

SATA, SCSI, or RAID Drives

If you have a SCSI or SATA drive, or a RAID controller, watch for the prompt that says **Press F6 if you need to load a SCSI or RAID Driver**. When it has finished initializing, follow the instructions below.

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Setup could not determine the type of one	Pertains to SCSI, SATA, or RAID devices only. If you do not have one of these devices, skip to the Welcome to Setup step.	Press S to Specify an Additional Devide
Windows Setup Please insert the disk labeled Manufacturer-supplied hardware support disk into Drive A:		Insert your driver diskette into Dri A. (It does not have to be labeled "Manufacturer-supplied hardware support"). Press Enter when ready.
•	You should be presented with a menu of the device drivers that are available on the diskette.	Select the correct driver on the menu and press Enter . You should see a message that says that the drivers are being loaded.
Windows Setup Setup will load support for the following mass storage device(s):		Press Enter to continue. If you have additional drivers to load, yo can press S here and go through the procedure again.
Welcome to Setup This portion of the Setup program prepares Microsoft ® Windows ® to run on your computer. • To set up Windows now, press Enter • To repair a Windows installation using Recovery Console, press R. • To quit Setup without installing Windows, press F3		Enter
Windows Licensing Agreement		Hit F8 to agree to the licensing agreement and continue.
installations is damaged, Setup can try to repair it. Use the UP and DOWN ARROW keys to select an installation. To repair the selected Windows installation, press R To continue installing a fresh copy of Windows without repairing, press ESC	This screen only comes up if you are replacing a previous installation. In order to make sure you are starting with a clean build, you should always choose to install a fresh copy without repairing	Press ESC
The following list shows the existing	On the next few screens, we will delete all of the partitions on the machine, and recreate them as follows: • C – 20 gig (Operating System) • D – remaining space (Data)	Select the C partition and press to delete it. See the next screen t continue

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The partition you tried to delete is a		Press Enter
To delete this partition, press		Another screen appears cautioning you that all data on the C partition will be lost if you continue.
ENTER.		Press L
To go back to the previous screen without deleting the partition, press ESC		
The following list shows the existing	If there are any more partitions on the drive,	Select the D (or E, etc.) partition
partitions and unpartitioned space on this computer.	delete them now (unless you have a pre-existing data drive that you want to keep).	and press D to delete it.
Use the UP and DOWN ARROW keys to select an item in the list.		Another screen appears cautioning you that all data on the D (or E,
To set up Windows on the select item, press Enter.		etc.) partition will be lost if you continue.
To create a partition in the unpartitioned space, press C		Press L
To delete the highlighted partition, press D		
The following list shows the existing partitions and unpartitioned space on this computer.	At this point you should have nothing but unpartitioned space, unless you have opted to preserve data on a one of the non-operating	Select the line that says "Unpartitioned Space", where the C Drive used to be.
Use the UP and DOWN ARROW keys to select an item in the list.	system partitions.	Press C
To set up Windows on the select item, press Enter.	Now you must recreate the C Partition.	
To create a partition in the unpartitioned space, press C		
To delete the highlighted partition, press D		
You have asked Setup to create a new partition on [disk info]		Key in 20000 Megabytes for a 20- gigabyte partition.
To create the new partition, enter a size below and press ENTER		Press Enter
To return to the previous screen without creating the partition, press ESC		NOTE: If you have a small hard drive (for example, on a laptop), you can change the partition size to 10 gigabytes (10000 Megabytes).
The minimum size for the new partition is (n) (MB)		Or, you may choose to only have one partition, the C Drive. In that
The maximum size for the new partition is (n) (MB)		case, do not create another partition for D, and substitute "C" for "D" in subsequent parts of this
Create a partition of size (in MB): n		document where specific path names are mentioned.
The following list shows the existing partitions and unpartitioned space on this computer.	Create a partition (D) for data, using the rest of the Unpartitioned Space.	Select the line that says "Unpartitioned Space" Press C
Use the UP and DOWN ARROW keys to select an item in the list.		
To set up Windows on the select item, press Enter.		
To create a partition in the unpartitioned space, press C		
To delete the highlighted partition, press D		

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You have asked Setup to create a new partition on [disk info]		box, re	the default number in the epresenting the remaining
To create the new partition, enter a size below and press ENTER			titioned space on the drive. Enter
To return to the previous screen without creating the partition, press ESC			
The minimum size for the new partition is (n) (MB)			
The maximum size for the new partition is (n) (MB)			
Create a partition of size (in MB): n			
The following list shows the existing partitions and unpartitioned space on this computer. Use the UP and DOWN ARROW keys to select an item in the list.	Now we will set up Windows. The first step is to format the C Partition.	say "N	t the C partition (it should lew (Raw)"). Enter
 To set up Windows on the select item, press Enter. To create a partition in the 			
unpartitioned space, press C To delete the highlighted partition, press D			
The partition you selected is not formatted. Setup will now format the partition. Use the UP and DOWN ARROW keys to select the file system you want, and then press ENTER. If you want to select a different partition for Windows, press ESC.	Choosing NTFS is very important here, as Windows Server cannot set up its full file system security model on the FAT system. Eventually you will not be able to set up a debugging environment in Visual Studio.NET, and you will have to reinstall the operating system. (A FAT partition can be promoted to NTFS, but Windows will not have set the permissions that it does during an installation. Getting that right is more difficult than a base install).	using Do no option	ee "Format the partition the NTFS file system". t choose the Quick Format Enter
Please wait while Setup formats the partition	There will be a progress bar below with a message that says, "Setup is formatting". This will take a few minutes	point, unatte	o and stretch your legs. At thi the installation will continue nded until the Regional gs screen below.
Please wait while Setup examines your disk. This may take several minutes.			creen will go by fairly quickly
Please wait while Setup copies files to the Windows installation folders. This may take several minutes to complete. [Progress bar that says, "Setup is copying files]	This concludes the character-based portion of the installation routine. When it completes, the computer will reboot. It will then start Windows and complete setup using a GUI interface. If you have loaded drivers from a floppy diskette, you must remove it before it reboots.	This w	vill take a few minutes.
Installing Windows There will be a grey screen with the following tasks listed on the left: Collecting Information Dynamic Update Preparing Installation Installing Windows Finalizing Installation	If you have loaded SATA, SCSI, or RAID drivers, you might be prompted to insert your driver disk again.	A mes screer the rei After a headir Device	rill take a few minutes. sage at the bottom of the main provide an estimate of maining time. a while, you will see a mag that says "Installing es, under which a progress ppears.
Regional Settings You can customize Windows for different	This is where you can customize the keyboard layout and system locale.		ot defaults.
regions and languages.		Next -	>

F	Personalize Your Software		Type in the name and Organizati
	Type the full name of your company or organization.		Use the machine name [] for "name".
Ν	lame: [Machine Name]		
C	Organization: [MIT]		Next ->
Y	our product key		Enter the MSDN Product Key:
			Next ->
L	icensing Modes		Choose Per Device or Per Use Next->
	Computer Name and Administrator Password		
C	Computer Name: []		
	Leave the Administrator password plank for now.]		[Next ->]
y p A	You have not specified a password for the Administrator Account. Are you sure you want to continue without setting a password? Type a password for the Administrator Account. Are you sure you want to continue without setting a password?	You will see this if you leave the Administrator password blank.	Click Yes
C	Date and Time Settings		Set the correct date, time and Time Zone.
+.			Next->
F	nstalling Network Please wait while Windows installs networking components.		This will take a few minutes. The is a progress bar as files are copied.
N	Networking Settings		Choose Custom Settings
+	letworking Components	You can set configure your IP address and	Next ->
	Networking Components	specify DNS servers here, or you can do it later. The procedure is described under the topic on	Next ->
		page 12.	
V	Vorkgroup or Computer Domain		Choose No, this computer is no a network, or is on a network without a domain. Type a workgroup name in the following box. Workgroup or computer
			domain:
			WORKGROUP
1.	nstalling Windows		Next -> This continues without interventi
	The grey setup screen returns.		This continues without interventi
	Progress bar messages:		When it is finished, the machine
	Copying Files		reboot.
	Completing Installation		
	nstalling Start Menu Items		Remove any CD or floppy left in
	Registering Components		computer prior to the reboot.
	Saving Settings		
			Press Ctrl-Alt-Delete to logon

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Windows Server Post-Setup Security Updates	This asks you to patch the server and configure automatic updates.	Click Finish We will do this later when the computer is connected to the network.	
Manage Your Server	The first time you log on as Administrator, you will see this screen.	Uncheck Show this screen at startup. Close the window.	

Driver Updates

Check your Windows Server installation to make sure that all the necessary drivers have been installed. If Windows was unable to install the correct driver for your hardware, now is the time to update them. Do not be surprised if you have several pieces of hardware that do not have the correct drivers. Typically you will need to manually install the video, network and audio drivers.

To determine which drivers you need to install follow theses steps:

- Click on Start
- Click Administrative Tools
- Select Computer Management
- In the Computer Management window, in the left column, select **Device Manager**
- If there are missing drivers, you will see yellow question marks in front of the items in the "**Other Devices**" section.

Below are a couple of steps that may help you install the missing drivers. If the steps outlined do not help, please contact the manufacturer of your computer to obtain the correct drivers.

Video Drivers

If Windows does not include a driver for your video card, now is the time to add one. If you do not have a driver CD that came with your computer, you will need to determine the make and model of your video adapter, and download the appropriate driver from the Vendor's web site. Since this machine should not yet be connected to the Internet, this must be done from another machine.

Reboot after the driver has been installed. When the system comes back up, the system will recognize the existence of new hardware if it is a plug-n-play device. You will get the following series of prompts:

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Found New Hardware Wizard This wizard helps you install software for: (the driver it found)

What do you want the wizard to do?
Choose Install the software automatically
Next->

Security alert - Driver Installation The installed INF file does not contain digital signature information. Do you still want to install this driver software?

Yes

Completing the Found New Hardware Wizard **Finish**

You may have to repeat this process, if more than one driver has been installed. When all of the drivers have been installed, reboot the machine.

After the reboot, your screen settings may have been updated automatically by Windows. If not, do the following:

- Right-click anywhere on the desktop, and select Properties from the pop-up menu
- Click the **Settings** tab in the Display Properties box. From the **Colors** dropdown box below, change the resolution to True Color (32 bit). Under **Screen Area**, you can change the sizing of your screen to suit your preference.
- Click **OK** when finished. A second box will pop up; click **OK**. A third box will appear; click **Yes**

Network Drivers

In most cases, Windows will simply recognize your network adapter when it installs. If it does not, however, you will need to add a driver for it. If you do not have a driver CD that came with your computer, you will need to determine the make and model of your NIC, and download the appropriate driver from the Vendor's web site.

Once you have the correct driver, follow this procedure.

- Right-click My Computer
- Properties
- · Hardware Tab
- Device Manager Button

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- Other Devices: Right-Click on **Ethernet Controller**. Should have a yellow question mark in front of it.
- Properties
- **Reinstall Driver** Button
- Install from a list or specific location (Advanced)
- Next
- Don't search. I will choose the driver to install
- **Browse** to the location of the driver
- Click **Open**
- Click **OK**
- Wait for the following messages:

The wizard found a driver for the following device: Ethernet Controller.

Windows found a driver that is a closer match for this device than your current driver. To install the driver Windows found, click Next.

- Next
- **Wait** until you get this message: Completing the Upgrade Device Driver Wizard.
- Click **Finish**
- Click Close
- Close the Device Manager Window
- Close the System Properties Window

Audio Driver

If Windows does not recognize your audio driver, obtain the correct driver and install it now. Reboot when finished.

After the reboot, go to Start-Control Panel->Sounds and Audio Devices. You should see the following message:

"This computer cannot play audio because the Windows Audio service is not enabled".

- Check the box next to **Enable Windows Audio** and press OK.
- Another dialog box will pop up that says "Windows Audio is now enabled, but the changes will not take effect until you restart Windows." Click Yes to reboot.

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Configuring the Network

This is where you will configure the computer's NIC card. You will need to get the following information from your network administrator:

- · IP address
- Subnet Mask
- Gateway address
- DNS Server addresses
- DNS suffix (if needed)

Start -> Control Panel -> Network Connections -> Local Area Connection (right-click and select Properties)

- Scroll down if necessary to the bottom of the list
- Click on Internet Protocol (TCP/IP)
- Click the **Properties** button
 If you are using DHCP to obtain an IP address, leave "Obtain an IP address automatically" selected. If not, select "Use the following IP address", and key in your IP address, Subnet mask, and Default gateway.
- · Click the Advanced Button at the bottom
- Click the **DNS** tab
- Click the Add.. button
- Add your local DNS Servers. Click **Add** after keying in each one, and then re-click the **Add**.. button to add the next one.
- Enter the DNS suffix in the area provided by clicking on the add button, entering the suffix and clicking the add button again. (optional)
- Now click the WINS tab
- For security reasons, select Disable NetBIOS over TCP/IP
- Click **OK** when finished.
- Click **OK** to close the InternetProtocol (TCP/IP) Properties window.
- Scroll up in the window until you see File and Printer Sharing for Microsoft Networks. Uncheck the box next to it. This is an essential security measure for any Windows machine with an Internet facing NIC. Otherwise, your machine will appear in Network Neighborhood to the world!
- Click **Close** to close the Local Area Connection Properties window.

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• Click **Yes** if it asks you if you want to restart your computer (Reboot).

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Internet Information Server (IIS)

In Windows Server 2003, IIS is not installed by default. Since this includes the Web Server, and the means by which ASP.NET pages are served, it must be installed.

Installing the Web Server

- From the Start menu, click Mange your Server
- Under Adding Roles to Your Server, click Add or remove a role
- On the Preliminary Steps dialog, click **Next** >
- A message appears: "At least one of the network connections on this server is currently disconnected..." Click **Continue**
- Configuration Options: Select Custom Config, then click Next>
- Under Server Role, click Application server (IIS, ASP.NET) and then click Next>.
- Click the boxes next to Front Page Extensions and Enable ASP.NET and then click Next >
- Review the Summary box, then click Next >
- Insert the Windows Server 2003 CD when prompted
- · Wait while components are installed
- When it is finished, you will see a message that says This Server is Now an Application server
- Click Finish
- · Close the Manage Your Server window

Changing the Default Web Server File Location

Next, change the default file location of the web site and the log files to the D Drive. If you do not have a D drive, skip to the next section, SMTP Server.

MIT's typical server setup utilizes two disks; one for the operating system and one for the data. You do not have to follow this configuration pattern. Please note that on laptops, it is better to use a single drive configuration.

Remember, if you do not use a D drive, you will need to substitute your correct system path information for the ones provided in this documentation.

Formatting the D drive

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Format the D Drive. If the D drive doesn't show up, you may need to use the Disk Manager to create the partition first.

- Start->My Computer (Right-click, choose Explore)
- Right-click on the **D Drive**, select **Format**...
- Make sure **NTFS** is selected
- For the Volume Label, type Data
- Do not check Quick Format or Enable Compression
- Click Start
- Click **OK** when the warning window pops up Formatting will erase all data on this disk.
 - If you have a large partition, this can take some time to complete.
- Open the Windows Eplorer
- On the **D Drive**, create a folder called **Logs** (D:\Logs)
- On the **D Drive**, create a second folder called **Inetpub** (D:\Inetpub)
- Create a sub-folder of Inetpub called **wwwroot** (D:\Inetpub\wwwroot)

Changing the IIS default directories

- Select Manage
- Expand Services and Applications
- Expand Internet Information Services
- Expand Web Sites
- Right-Click **Default Web Site**
- Select **Properties**
- Click on the **Web Site** tab
- Next to Active log format, at the bottom, click Properties
- In the Log file Directory box at the bottom, type D:\Logs
- Click OK
- Click the **Home Directory** tab at the top
- In the Local Path box, change the drive letter from C to D (D: \inetpub\wwwroot)
- · Click OK

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 Stop and restart IIS by selecting Start->Run and typing iisreset on the command line.

SMTP Server

The iLabs Service Broker sends mail for things like help requests and bug reports. For this, you must add the SMTP Server Role to your Windows 2003 server.

Adding the Server Role

- Open the Manage Server window. Start -> Manage Your Server
- Under Adding Roles to Your Server, click Add or remove a role
- On the Preliminary Steps dialog, click Next >
- A message appears: "At least one of the network connections on this server is currently disconnected..." Click **Continue**
- Configuration Options: Select Custom Config, then click Next>
- Under Server Role, click Mail server (POP3, SMTP). It should say "no" under "configured". Click Next>.
- Authentication Method: select Local Windows Accounts
- Type in the domain for receiving mail in the mail boxes (this is for POP3; not needed for the iLabs Service Broker. If you have a fully qualified domain name (e.g. machine.domain.edu) type it here; otherwise just enter the machine name).
- Click Next >
- Review the Summary box. It should say "Install POP3 and Simple Mail Transfer Protocol (SMTP) to enable POP3 mail clients to send and receive mail". Click Next >
- Insert the Windows Server 2003 CD when prompted. If autoplay brings up a screen that says "Welcome to Microsoft(R) Windows(R) Server 2003", close it.
- Wait while components are installed
- When it is finished, you will see a message that says This Server is Now a Mail server
- Click Finish
- Close the Manage Your Server window

Setting Access Permissions

• Start-> Right-Click on My Computer

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- Select Manage
- Expand Services and Applications
- Expand Internet Information Services
- Expand Default SMTP Virtual Server
- Right-Click **Default SMTP Virtual Server**
- Select **Properties**
- Access tab
- Connection button
- Select which computers may access this virtual server: Make sure the "Only the List Below" option is selected. Click the **Add**... button
- Make sure "Single Computer" is selected, and key in IP address 127.0.0.1 to permit only the local machine to access the SMTP server.
- Click **OK**
- Click **OK** again
- Click the **Relay** button
- Make sure the "Only the List Below" option is selected. Click the Add... button
- Make sure "Single Computer" is selected, and key in IP address
 127.0.0.1 to permit only the local machine to relay messages through the SMTP server.
- Uncheck the box that says "Allow all computers which successfully authenticate to relay, regardless of the list above".
- · Click OK
- Click **OK** to close the Default SMTP Virtual Server Properties page.

After you install the Service Broker Code, you will need to make sure that the web.config file is updated with the correct email addresses for both the supportMailAddress key and the registrationMailAddress key. If these keys are not entered, you will receive the following error message:

Exception: Could not access 'CDO.Message' object.
Inner Exceptions:
Exception has been thrown by the target of an invocation.
At least one of the From or Sender fields is required, and neither was found.

Security

Local Security Policy

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Open Start->Administrative Tools->Local Security Policy

These changes will cause various events to be written to the Security Event Log.

Under Account Policies -> Account Lockout Policy:

- Account lockout threshold -> 10 invalid login attempts
- Account lockout duration -> 30 minutes
- Reset account lockout after -> 30 minutes

Under Local Policies -> Audit Policy

- Audit account logon events -> Success, Failure
- Audit account management -> Failure
- Audit directory service access -> Failure
- Audit logon events -> Failure
- Audit object access > No auditing
- Audit policy change -> Success, Failure
- Audit privilege use -> No auditing
- Audit process tracking -> No auditing
- Audit system events -> Failure

Close the Local Security Settings Window

Windows Firewall

Windows Server 2003 ships with a firewall feature. This should be enabled for security.

Start -> Control Panel -> Network Connections -> Local Area Connection (right-click, select Properties)

- On the Local Area Connection Properties sheet, click the Advanced tab.
- Check the box next to Protect my computer and network...
- Click the **Settings** button
- Select the Gerneral tab and turn the firewall ON
- Select the Exceptions tab and click the box next to Remote Desktop (if you intend to use Terminal Services to access the machine remotely)
- Select the Advanced tab

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- In the Network Connection Settings area make sure the Local Area Connection box is checked and click on Settings
- In the **Services** tab, click the box next to **Web Server (HTTP)**
- Select the default for the Name or IP address of the computer hosting this service on your network; click **OK**.
- Click the box next to **Remote Desktop** and select the default for the Name or IP address; click **OK**
- Click the box next to Secure Web Server (HTTPS) and select the default for the Name or IP address of the computer hosting this service on your network; click OK.
- Leave the other boxes unchecked (or check the service you want to use, such as FTP)
- Click **OK** to close the settings.
- Click **OK** to close the Advanced Settings Box.
- Click **OK** to close the Local Area Connection Properties Box.

Settings

Remote Desktop

To log on to this server remotely, you will need to enable Remote Desktop.

- Right-click My Computer, select Properties
- Click the Remote tab
- Check the box next to Enable Remote Desktop on this computer
- Click **OK** when the information box pops up letting you know that some accounts might not have password.
- Click \mathbf{OK} to close the Properties window.
- You won't need to add specific users unless you want individuals who do not have Administrator privileges to log on remotely.

SQL Server 2000 Enterprise

SQL User Account

Before installing SQL/2000, create a user account for SQL/2000 Services.

- Right-Click on My Computer
- Click Manage

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- Expand Local Users and Groups
- Right-Click **Users**
- Click New User...
- User name & Full name: SqlAccount
- Description: Account for SQL Services
- Password: Type a strong password (at least 10 characters long, includes upper case and lower case characters as well as numbers or special characters). Note: there is a good freeware utility to generate strong passwords called **rpgen**, available here: http://www.paehl.de/rpgen.zip Make sure you keep track of the passwords.
- Uncheck User must change password at next logon
- Check User cannot change password
- Check Password never expires
- Click Create
- Click Close

Base Product

Before installing SQL Server, create a folder on the D Drive to contain the data.

- On the D Drive, create a folder called **Database**
- Open this folder and create a sub-folder called Data
- In the Database folder, create another sub-folder called **Backup**

Place the SQL Server 2000 Enterprise CD in the CD Drive.

- The installation program should load automatically. If it does not, Navigate to <CD Drive>:\ENGLISH\ENT and Double-click Autorun.exe
- Click SQL Server 2000 Components
- Click Install Database Server
- You will see an error message: SQL Server 2000 SP2 and below. We will fix this later; for now, click Continue
- Welcome to the Microsoft SQL Server Installation Wizard. Next->
- Accept the default of Local Computer. Next ->
- Accept the default of Create a new instance of SQL Server... Next

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- For name, enter the Machine Name. For Company, enter your university or company name. Next->
- Click **Yes** to accept the License agreement
- Accept the default of Server and Client Tools. Next ->
- Leave the box next to **Default** checked. **Next ->**
- Setup Type: Check the **Custom** radio button
- Leave the program and Data files in their default location (We will change the data file location later) Next->
- Select Components: Leave the defaults, unless you also want the code samples. Click Next ->
- Service Accounts: **Use the same account** for Each Service. **Use A Domain User Account** For security reasons, it is a good idea not to run the SQL Server as administrator. Use the SqlAccount user you created earlier for running the SQL Server services. Enter SqlAccount for the username and the password in the correct boxes.
- Next ->
- Authentication Mode: Windows Authentication Mode. Next->
- Collation Settings: Accept defaults. Next->
- Network Libraries: Accept defaults. Next->
- Start Copying Files. Setup has enough information... **Next->**
- Choose Licensing Mode: **Per Seat** for **25** devices. Click **Continue**
- Wait while the product is installed.
- **Setup Complete**. When you see this message, click **Finish**.
- Remove the CD, and **Reboot** the machine.

Changing the default file locations

- Click Start-> Enterprise Manager
- Navigate to Console Root->Microsoft SQL Servers->SQL Server Group->Machine Name (may say (local) (Windows NT))
- Right-click on the Server name (or "local") and click Properties.
- Click the **Database Settings** tab.
- Near the bottom, click the ... button to the right of the **Default data** directory box. Navigate to D:\Database\Data
- Click OK

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- Repeat this procedure for the **Default log directory** (note: the log files can go in the same directory as the data files).
- · Click OK
- Exit Enterprise Manager

Service Pack 3a

- Insert the SQL Server 2000 Service Pack 3a CD.
- Run **setup.bat** from the root of the CD.
- When the wizard starts, click Next->
- Click Yes to accept the License Agreement
- Click Next to accept the default instance name.
- Click Next to accept the default of "The Windows account information
 I use to log on..."
- Wait while the username is validated.
- Enter SA Password: type a strong password (at least 10 characters long, includes upper case and lower case characters as well as numbers or special characters). Make sure you keep track of the passwords.
- Check the box next to Upgrade Microsoft Search and apply SQL Server 2000 SP3 (required), and click Continue
- Error reporting: leave the box unchecked, click **OK**
- Wait until the "Setup is gathering information" message completes
- Start Copying Files. Setup has enough information....Next ->
- Wait while as Service Pack 3a is installed. This will take a while.
- Ignore the message that says you should backup your master and msdb database. Click \mathbf{OK}
- Click Finish
- Remove the CD, and Reboot the machine.

Security Configuration

SQL Server can be an avenue for hackers to gain access to your system, if it is not properly administered. SQL Server security is a big topic, so a comprehensive discussion of it is beyond the scope of this document. We will, however, cover the basics.

Potential Security Breaches

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Practically speaking, there are two main ways a hacker can gain access to your system through SQL Server:

Direct Attack

An attacker may try to break into your system directly, by connecting to SQL Server's default TCP port of 1433. If this happens, and you are using SQL or Mixed Authentication, a hacker can use a password grinder to discover your "sa" password (The SQL Authentication built-in administrator account). Once someone has gained access to this account, they can execute operating system commands on your server using the <code>xp_cmdshell</code> stored procedure built into SQL Server. This is arguably the worst system compromise there is, as someone can then set up shop on your system and do anything you could do as the administrator.

Since we are using Windows Firewall, port 1433 is closed by default. You may want to open this port and connect to your SQL Server from another machine using Enterprise Manager, but this is not advisable unless your machine is on a subnet which is behind a firewall. You should not open port 1433 and allow outside connections to SQL Server on a machine which is exposed to the Internet.

SQL Injection

SQL Injection is used to attack a SQL Server through a web application. It is a process based on making educated guesses about how a web developer constructed the SQL statements which return data to a web page.

A common design pattern is for a developer to accept user input from a web form (for example, customer name), and then use string concatenation to build a SQL statement from that input (e.g. "SELECT * FROM customers WHERE customer_name = " + Request["customerName"]). Since the entire concatenated statement is going to be interpreted by the SQL query engine, what would happen in this example if someone keyed in another SQL statement in place of the customer name? If a hacker guesses correctly, an incredible amount of data can be returned from SQL server, up to and including a dump of every row of every table to the screen.

Defending Against Common Security Breaches

Direct Attack

If you follow these steps, you should never have to worry about direct access to your SQL Server. Note: If you have followed the instructions in this document, these settings should already be in effect.

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- Make sure that Windows Firewall is in effect and that port 1433 is not open.
- Set up SQL Server to use Windows Authentication, not Mixed Authentication.
- Configure SQL Server to run as a non-privileged user (We have already created such a user, SqlAccount). Do not allow SQL Server to run under the SYSTEM account, or an account with Administrator privileges.

SQL Injection

The bad news about SQL injection is that there is no way to configure your server to defend against it; it is completely dependent on the coding practices of your web site's developers. The way to guard against SQL injection attacks is to use parameterized SQL statements in the code, rather than build SQL statements by concatenating them with user input from a web site. If SQL parameters are used, input data is treated as literal data and never as part of a statement. Also, strict type-checking is done.

The good news is that a SQL injection attack cannot do much to damage your system since an ASP.NET web site runs under a less privileged account, which does not have permission to execute **xp_cmdshell**. The risk with SQL injection lies in having your data exposed and stolen.

Other SQL Configurations

Following are some other recommended security options for SQL Server.

- Remove the sample databases (Northwind, Pubs)
 - •.)1Open Enterprise Manager: Start-> Enterprise Manager
 - •.)2Expand the tree at left to show Databases: Console Root -> Microsoft SQL Servers -> SQL Server Group -> (local) (or ServerName) -> Databases
 - •.)3Find **Northwind** in the list of databases.
 - •.)4Right-click on Northwind, and select **Delete**
 - •.)5Click "Yes" on the "Are you Sure" prompt
 - ullet.)6Delete the $oldsymbol{pubs}$ database, as above.
- Enable SQL Server login auditing.
 - •.)1 Open Enterprise Manager: Start-> Enterprise Manager
 - •.)2 Select the root of your SQL Server ("(local)" or the server name).

- •.)3 Right-click and select **Properties.**
- •.)4Select the **Security** tab
- •.)5 Set Audit Level to "**Failure**". This will show failed SQL Logins in the Application Event log (if you have port 1433 open to the Internet, you will probably see hundreds of them).
- To view events in the Application Event Log
 - •.)1 Right-Click on My Computer
 - •.)2Open System Tools->Event Viewer-Application
 - •.)3Look at entries for MSSQLSERVER

Finishing Tasks

User Accounts

Create a new Administrator account as follows:

- Right-Click on My Computer
- Click Manage
- Expand Local Users and Groups
- Right-Click **Users**
- Click New User...
- User name & Full name: YourAccountName
- Password: Type a strong password (at least 10 characters long, includes upper case and lower case characters as well as numbers or special characters). Note: there is a good freeware utility to generate strong passwords called **rpgen**, available here: http://www.paehl.de/rpgen.zip
- Uncheck User must change password at next logon
- Click Create
- Click Close
- In the right panel, Right-click the newly-created user
- Click Properties
- Click the **Member Of** tab
- Click Add
- Type **Administrators**

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- Click Check Names. Your typing should be replaced with [] \ADMINISTRATORS
- Click Add
- Click **OK**
- Click OK

Rename the Administrator Account

Change the built-in Administrator's permissions to "Guest". Use the **Member Of** tab as described above.

Reset the built-in Administrator's password to a strong password: At least 10 characters, using mixed case characters, numbers, and special characters.

Legal Notice

A legal notice at sign-on serves both as a warning to hackers, and as an impediment to password grinders.

To create your own notice, open Regedit to the following path:

HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion \Winlogon

There are two keys:

LegalNoticeCaption (what appears on the top of the window). Good choice for this are "Notice", "Attention", "Warning", etc..

LegalNoticeText (the legal notice itself)

Here is an example of a legal notice:

Unauthorized attempts to defeat or circumvent security features, to use this computer for other than its intended purposes, to deny service to authorized users, to access, alter, obtain, damage or destroy information, or otherwise to interfere with this computer or its operation are prohibited. Evidence of such acts may be disclosed to law enforcement authorities and result in criminal prosecution under applicable criminal laws.

Explorer Settings

Under **Tools->Folder Options**, click the **View** Tab. Change the settings to your liking, click **Apply**, then click the **Like Current Folder** button. Click **Yes** on the dialog box that pops up. Click **OK** to close the box.

Optionally, rename My Computer to the machine's name. This helps you keep track of which machine you are accessing when using remote desktop.

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Tree control Tool

- Unzip the distribution file webctrl_client.zip into the D:\Inetpub \wwwroot directory.
 - · Right-click on the zip file
 - Select Extract All...
 - Click Next>
 - Leave the default directory. Click Next>
 - Click Finish

You should now have a directory structure that looks like D: \Inetpub\wwwroot\web_client\1.0\... If you only have a \1.0\... directory, you dragged-n-dropped the folder from the zip and did not extract it. The Tree Control will not find its images unless this path is correct.

- Put the Tree Control dll into the Service Broker virtual directory.
 - Copy the Microsoft.Web.UI.WebControls.dll file into the virtual directory ServiceBroker/www/bin

Anti-Virus Software

It is a good idea to install one of the commercial anti-virus software packages. Good choices are McAfee or Norton (Symantic).

Disk Image

Before continuing, if possible, create a disk image of your operating system build, using Norton Ghost or a comparable product. While not strictly necessary, this will save a great deal of time in the event that a rebuild of the operating system becomes necessary. If your system is broken into by hackers, infested with spyware, etc. this is the most reliable method of removing all traces of malicious code that may have been hidden on your hard drive. Doing this before connecting to the network increases the odds that your build is virus-free.

Incidentally, one of the main reasons for keeping all data on a separate partition from the operating system is to make it fairly easy to rebuild the operating system should it become corrupt, overly bloated, etc.

Connect to the Network

You may now connect the NIC to the network.

Windows Update

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The first thing you should do after connecting to the Network is to run Windows Update. This will insure that your machine has the latest Windows patches.

- Start-> Help and Support -> Windows Update
- Do you want to install and run Windows Update... Yes
- Scan for Updates
- Review and Install Updates
- Windows Update will have selected all Critical Updates and Service Packs. If you want to look at the other options under Windows Server 2003 or Driver Updates, you may do so, but this is not strictly necessary. If you do, select the ones you want to install with the Add button. When finished, click once again on Review and Install Updates
- Click Install Now
- Wait as the updates are downloaded from the Internet.
- Most likely, there will be a message asking you to reboot. Click **OK**

Note: You may have to run update two times if any of the patches have to be applied separately.

After you have updated and rebooted your system, set it to check for Windows Updates automatically.

- Start-> Control Panel -> System -> Automatic Updates tab
- Check the box next to Keep my computer up to date
- Check the radio button next to Notify me before installing any updates and notify me again before installing them on my computer
- Click **OK**

Install .NET 2.0 framework

The Interactive iLabs Architecture needs the .NET 2.0 framework to be installed. This is not installed when you installed Windows Server 2003.

Download the Microsoft .NET framework from http://www.microsoft.com/downloads/ there should be a link to the .NET Framework Version 2.0 Redistributable Package (x86).

Once the dotnetfx.exe file is downloaded, double click on the file to install it.

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Activate Windows

- Start-> All Programs -> Activate Windows
- Click the radio button next to "Yes, let's activate Windows over the Internet now"
- Click Next>
- Click the radio button next to "No, I don't want to register now"
- Click Next>
- You should see a message: "You have successfully activated your copy of Windows".
- Click OK

Visual Studio.NET 2003

Product Installation

Note: If this machine is not going to be used for development, installation of Visual Studio.NET is not necessary.

This is a lengthy process.

- Right-click on **My Computer** and click on **Manage**.
- Expand Local Users and Groups
- Double-click on Users
- Right-click on Administrator
- Click Set Password.
- Type a password twice, and click **OK**
- The password has been changed. Click \mathbf{OK}
- Close the Computer Management window.

Now get the Visual Studio.NET 2003 CDs. There should be three at a minimum, seven for the full installation:

- •.)1 Visual Studio.NET 2003 Prerequisites
- •.)2Visual Studio.NET 2003 Enterprise Architect, Disc 1
- •.)3Visual Studio.NET 2003 Enterprise Architect, Disc 2
- •.)4Visual Studio.NET 2003 Library, Disc 1
- •.)5Visual Studio.NET 2003 Library, Disc 2
- •.)6Visual Studio.NET 2003 Library, Disc 3

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- •.)7Visual Source Safe 6.0d (Optional; install if you want to have a source control environment on this machine)
- Insert Visual Studio.NET 2003 Enterprise Architect, Disc 1. Wait a moment for Autorun to start.
- Click on Visual Studio.NET Prerequisites.
- When prompted, Insert Visual Studio.NET 2003 Prerequisites. Click OK when ready.
- License agreement: Click I agree.
- Click Continue
- Click Install Now.
- Check box next to Automatically log on. Enter your Administrator password twice.
- Click Install Now!
- When the Prerequisites Installation finishes (it will take a few minutes, click **Done**.
- Click 2. Visual Studio.NET
- When prompted, insert Visual Studio.NET Disk 1. Click **OK** when ready.
- License Agreement: Click I agree
- Type in the machine name next to Your Name
- Click Continue
- · Accept the defaults, and click Install Now!
- Insert Visual Studio.NET Disk 2 when prompted (After approx. 15 minutes). Click ${\bf OK}$
- After approx. 15 minutes, you will see this message: **Step 2 of Setup** is complete. Click **Done**. Remove the CD.
- Click 3 Product Documentation
- When prompted, insert Visual Studio Library Disk 1 (prompt might specify MSDN disk 1). Click **OK**.
- Welcome... Click Next>
- License Agreement: Check I accept the terms...
- Click Next->

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- Enter the machine name for User Name, and MIT for the Organization.
- Click Next->
- · Check Full
- Click Next->
- Accept the default destination folder, and click Next->
- Click Install
- When prompted, insert Visual Studio Library Disk 2. Click **OK**.
- When prompted, insert Visual Studio Library Disk 3. Click **OK**.
- · Library Setup Wizard Completed. Click Finish
- Click Exit
- Security Updates: Click **No** (we'll do this later)

Visual Studio.NET 2005

iLabs Project

Now, create the Visual Studio project. Note: This step is not necessary if you do not intend to develop on this machine.

- Start->Run->Microsoft Visual Studio.NET 2003-> Microsoft Visual Studio.NET 2003
- Click on the **Projects** tab
- Click Open Project
- Browse to D:\MIT iCampus\iLabs\serviceBroker60 \architecture\ ILabs.sln
- Click **OK**
- Wait while Visual Studio loads the code. If you get an error message that says that it cannot find the directory, simply correct it by browsing to the location where the code in question currently resides.
- Do a Test Build: Build->Build Solution. If it builds without errors, your installation is a success

Note: You cannot develop in Visual Studio against a website that is running SSL. If you have problems, check to make sure that SSL is not turned on in web.config. See on p.

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{Error calculating value!: Bookmark "_Ref105304064" was not found in this docum

Problems under XP

- In the virtual directory properties make sure Default.aspx is in the documents section
- Make sure that the .NET framework is installed
- Run the .Net framework-iis installation aspnet_regiis.exe from the command prompt (C:\WINDOWS\Microsoft.NET\Framework)

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