

Distributed Monte Carlo Simulation with TreeAge Pro and TreeAge Pro Interactive

The TreeAge Distributed Monte Carlo simulation module allows a Monte Carlo simulation to be divided among a group of networked computers. The distributed simulation can be initiated from either a TreeAge Pro 200X client, or a Visual Basic or other Windows program built using the TreeAge Pro Interactive.

This document provides detailed instructions on setting up the TreeAge Distributed simulation module on your network, and basic instructions for running distributed simulations from either TreeAge Pro or TreeAge Pro Interactive.

1. SETTING UP “HELPER” COMPUTERS

To designate a Windows computer on the network as a “helper” computer – i.e., make it available for distributed Monte Carlo simulations – the helper computer must have two components installed:

- “TreeAgeDistributed.exe” (manages communication between client and helper computer)
- “TreeAgePro.dll” (Interactive version of TreeAge Pro, for running simulation on helper)

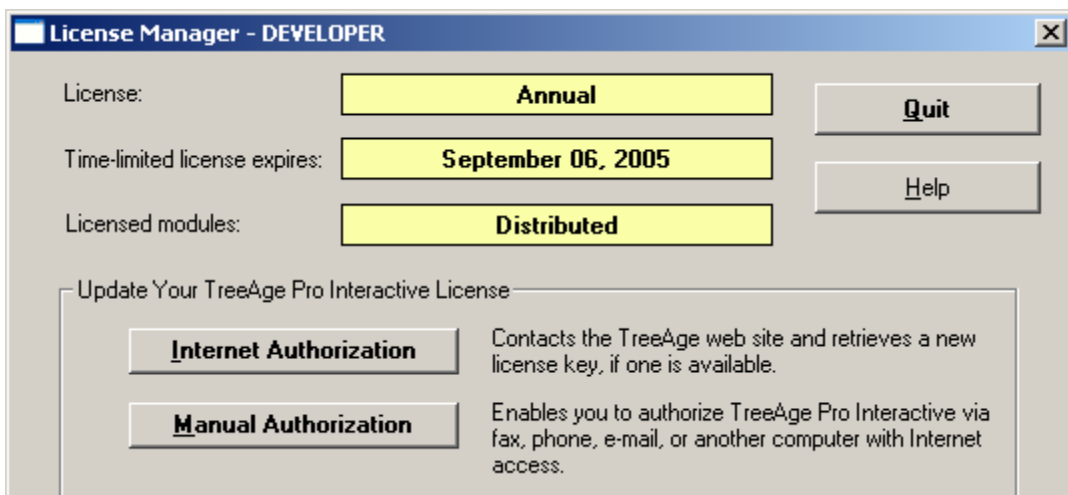
The regular **TreeAge Pro** software does not have to be installed on a helper computer.

Installing the **TreeAge Distributed** simulation module on a helper computer copies and registers required files, and adds test applications as well. The installer will then prompt you to complete two additional steps: 1) authorize the TreeAge Pro Interactive version license; and 2) ensure DCOM is setup properly in Windows (see below).

1.1 Authorizing the TreeAge Pro Interactive License

A serial number for the TreeAge Pro Interactive/Developer version can be used to enable the distributed simulation module on a specified number of helper computers. In the TreeAge Pro Interactive License Manager, click on Internet Authorization to unlock the license.

If you need to open the License Manager at a later time, go to the “START > Programs > TreeAge Pro Interactive” program folder. The installer places additional supporting files and shortcuts under “START > Programs > TreeAge Pro Interactive > Distributed Monte Carlo”.



1.2 Enabling DCOM on a Helper Computer

DCOM configuration options vary under different versions of Windows. You will need to check that DCOM is enabled on the computer, and set appropriate launch and access permissions for the client/user that will connect to the TreeAgeDistributed program. Make sure that Windows is using the latest service pack.

A detailed description of DCOM configuration options and troubleshooting is provided at the end of this document.

2. USAGE DETAILS

When you run a distributed simulation in either TreeAge Pro or TreeAge Pro Interactive, the software divides the simulation among selected available helpers, sending each one a packaged copy of the current tree along with instructions for simulation. The Helper computers will send back results in batches as they are completed.

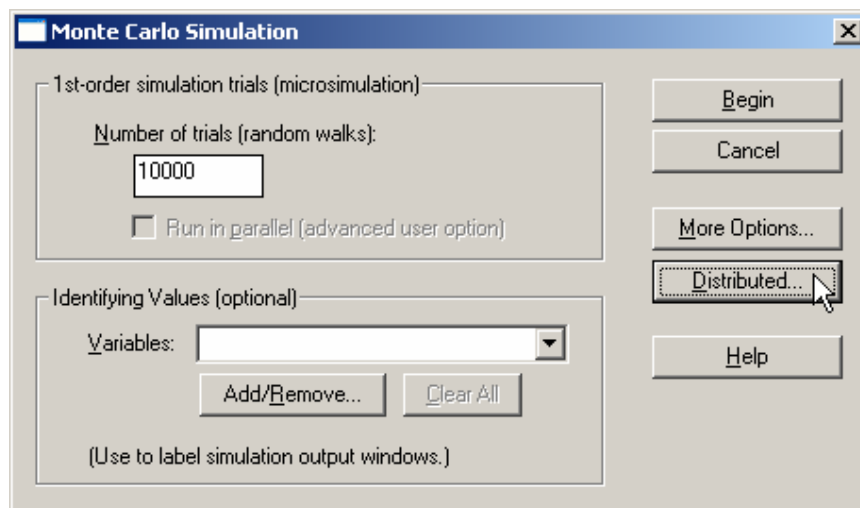
2.1 Some Limitations

Currently, only one processor will be used on each helper computer, even if it is a multiprocessor machine. To use multiple processors on a computer, you have to run a regular, non-distributed simulation on the computer. A helper computer can only run one distributed simulation at a time. Subsequent requests must wait until the currently running simulation completes.

Trees using dynamic links to Excel spreadsheets currently cannot use distributed simulation.

2.2 TreeAge Pro 200X Client

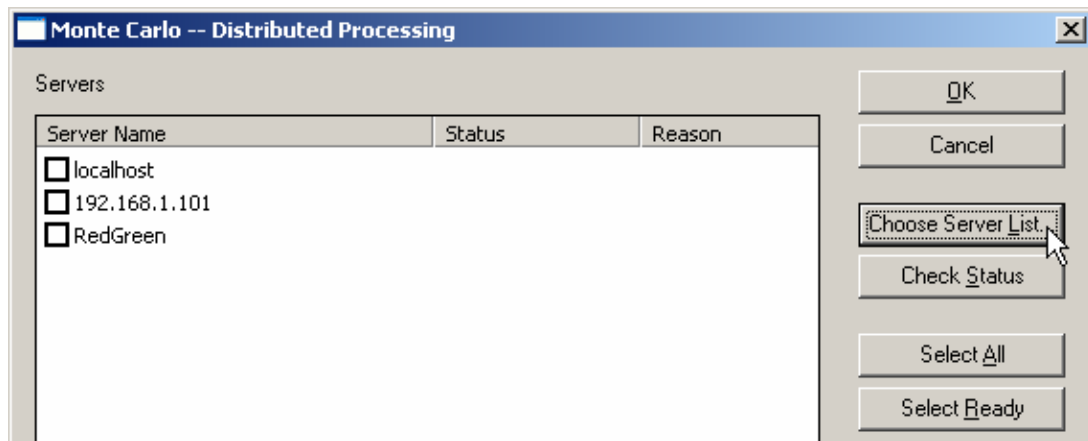
In TreeAge Pro, click on the **Distributed...** button in the Monte Carlo simulation setup dialog in order to load and/or select from a list of helper computers.



TreeAge Pro does not automatically search for helper computers. You must create a plain text file including the names or IP addresses of possible helper computers on the network (if your computer will also be a helper in the simulation, you can refer to it either by name, address, or as "localhost"). Create a new, blank text file (with a *.txt extension). Names are not case sensitive. Each name or address must be followed by a carriage return (including the last entry). The contents of your text file might look like the one show here, at right.

```
localhost
192.168.1.101
192.168.1.103
Server3
RedGreenPC
```

Once you choose a list, TreeAge Pro will display it each time you open the Distributed Processing dialog. Pick helper computers from the list. Either check the boxes for the helper computers to use, or click the Select Ready button to select those that TreeAge Pro can reach on the network (although this could take a long time on a network).



2.3 TreeAge Pro Interactive Clients

To support network multi-processing, the TreeAge Pro Interactive ActiveX component adds one new property on **MonteParams** and two new functions on **TreeObj**:

MonteParams:

Property serverlist as String()

Access: write only

Description: Sets the names of the servers to use for a distributed Monte Carlo simulation. A server name can be the name of the machine or its IP address.

TreeObj:

Function GetErrorFromServer(server As String) As String

Description: Returns the last error from the last run on the given server or the empty string if there was no error.

Function NumOutputsFromServer(server As String) As Long

Returns the total number of outputs successfully completed by the given server. One output represents one sample unless the number of samples is zero (i.e., "microsimulation" or "random walk"), in which case one output represents one trial.

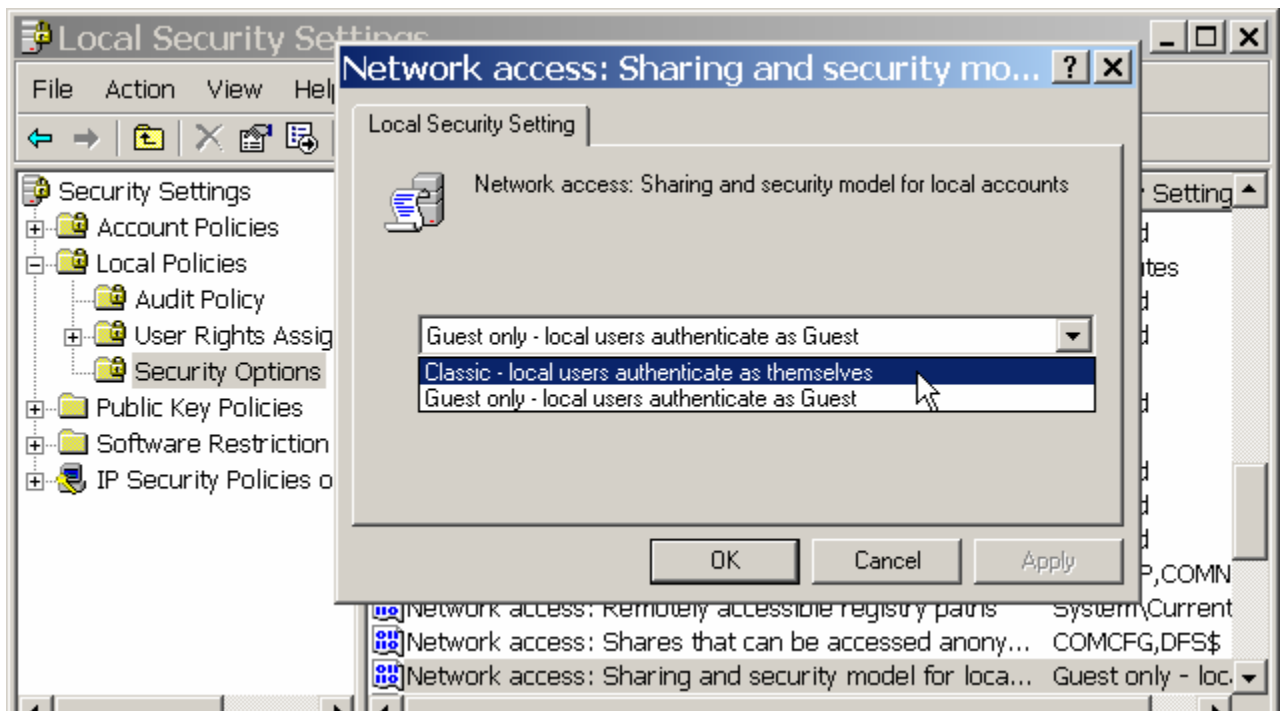
Here is a snippet of VBA code which illustrates the use of the Interactive methods in a macro:

```
Dim mc_params As New monteParams, mc_output As MonteOutput
Dim serverlist() As String
serverlist = Array("red", "blue", "green")
mc_params.serverlist = serverlist
mc_params.samples = 1000
mc_params.trials = 500

Set mc_output = tree.MonteCarlo(mc_params)
Dim i As Integer
For i = 0 To UBound(serverlist)
    debug.print serverlist(i) & ":" & " Outputs: " & _
        tree.NumOutputsFromServer(serverlist(i))
    If (Not tree.GetErrorFromServer(serverlist(i)) = "") Then
        debug.print " Error: " & _
            tree.GetErrorFromServer(serverlist(i))
    End If
Next i
```

3. PEER-TO-PEER VS. DOMAIN NETWORK CONFIGURATIONS

- The distributed simulation can utilize either a Windows **domain network** or a **peer-to-peer workgroup**. If the client and helper computer are in the same domain, add the client user to a group that you have assigned launch and access permissions in the DCOM configuration.
- If the computers in the distributed simulation (including the client computer where you start the simulation from) are networked **peer-to-peer**, as in a home office or computer lab, then you will need to create a user account on the helper computer having the same name and password as your login on the “client” computer (i.e., where you run TreeAge Pro). In XP, run SecPol.msc and set “Network access: Sharing and security model...” to “Classic...”.



4. ENABLING DCOM CLIENT ACCESS ON HELPER COMPUTERS – DETAILS

4.1 *Windows 95/98/Me:*

For information on getting DCOM running under Windows 95/98, see: <http://support.microsoft.com/kb/q165101/>

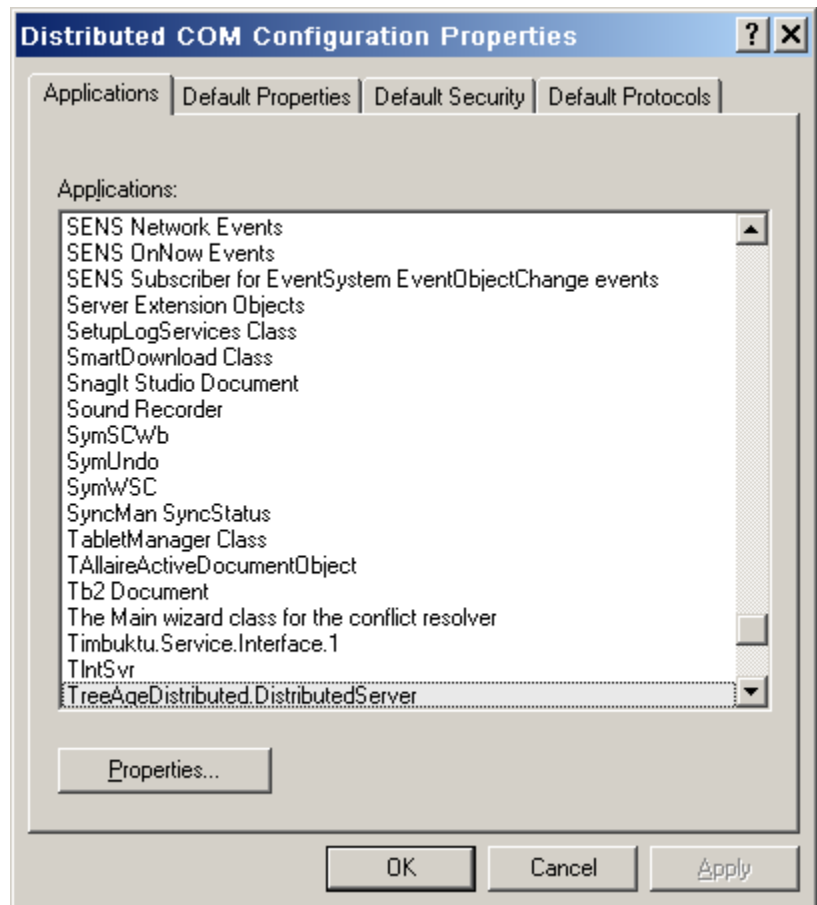
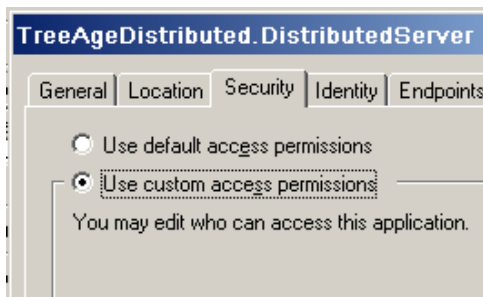
4.2 *Windows 2000:*

To check the settings for DCOM in Windows NT/2000, choose START > Run..., type "dcomcnfg" as the command line, and click OK.

In Windows versions prior to XP, the Distributed COM Configuration Properties window will appear.

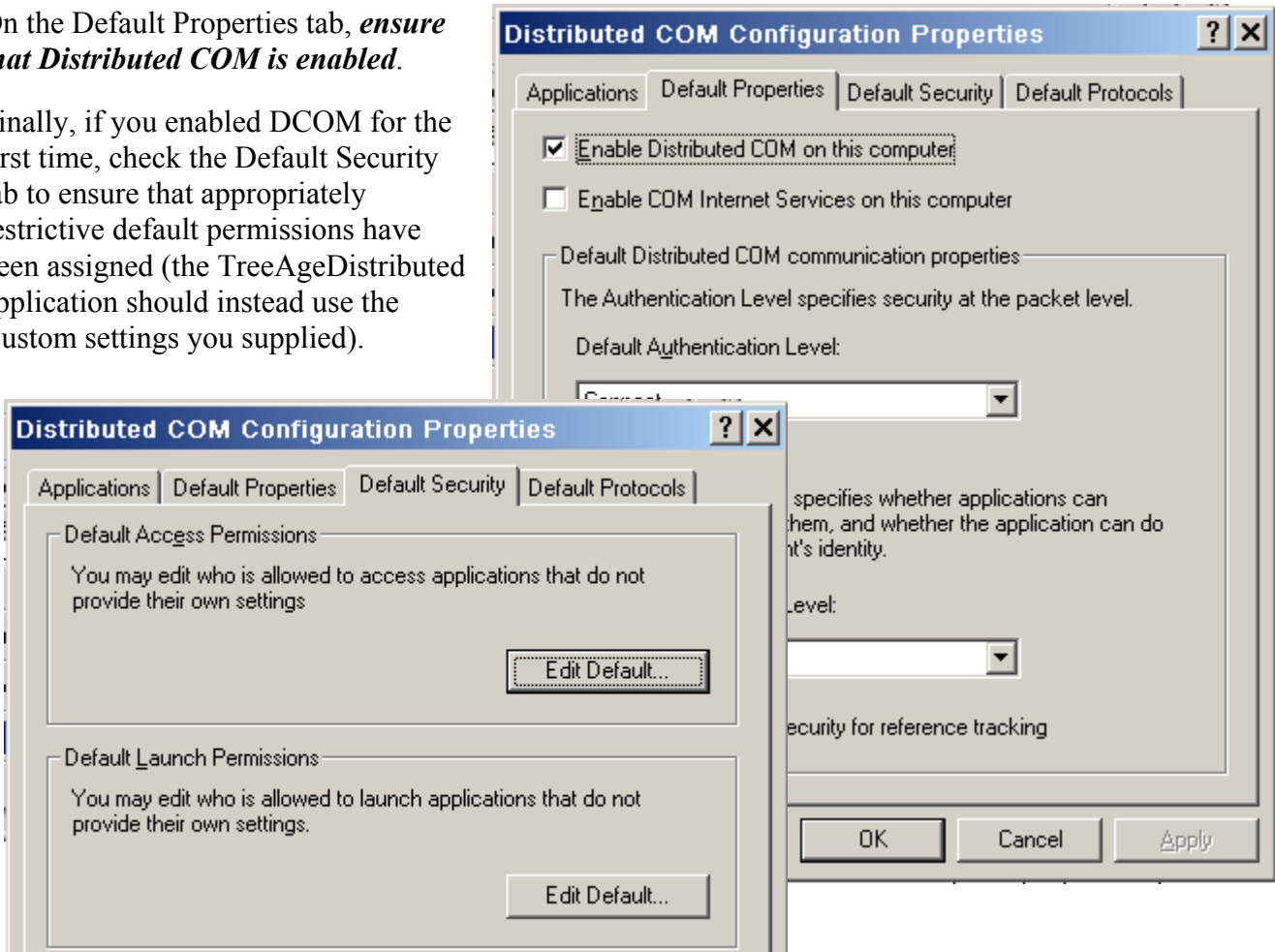
TreeAgeDistributed should appear in the list of DCOM applications if it has already been installed. To set specific security permissions for the program, select it and click the Properties... button. Give both launch and access permissions to the user (or group) that the client will use to connect to the helper computer. Insufficient permissions will result in a client receiving errors when trying to connect to a helper computer. On the helper, first fix permissions and then restart/log off (to stop TreeAgeDistributed if it running).

NOTE: Adding a client to an administrator group temporarily could be used to test permissions issues.



On the Default Properties tab, *ensure that Distributed COM is enabled*.

Finally, if you enabled DCOM for the first time, check the Default Security tab to ensure that appropriately restrictive default permissions have been assigned (the TreeAgeDistributed application should instead use the Custom settings you supplied).

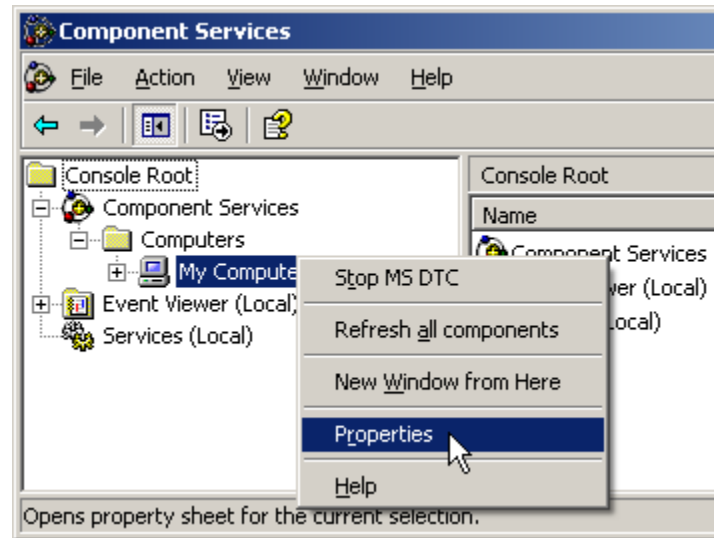


4.3 Windows XP:

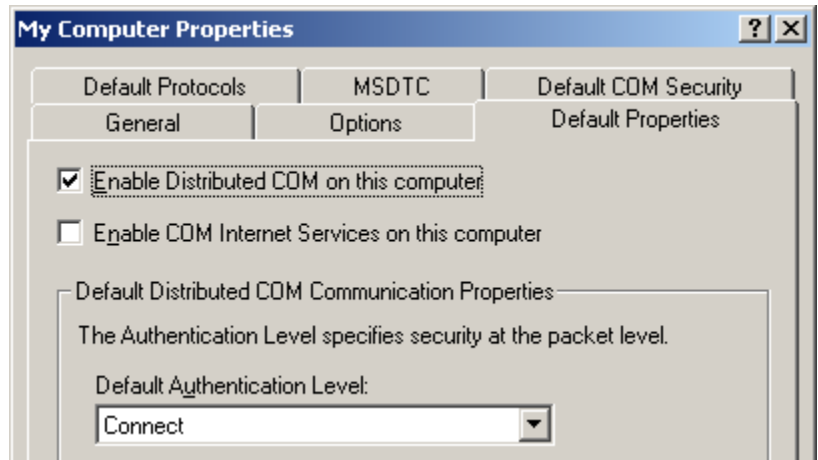
XP Clients and Servers using DCOM to communicate over a network and they will be impacted due the improvements contained in Service Pack 2. When Service Pack 2 is installed with all default settings, all DCOM communications may fail.

3.3.1

In Windows XP, the Component Services window is displayed initially when you run DCOMCNFG from the START > Run... command line. In this window, expand "Console Root > Component Services > Computers", select "My Computer", and choose Properties from the right-click or Action menu.



From the available tabs in the My Computer Properties dialog, select Default Properties. The setting "Enable Distributed COM on this computer" must be checked.



4.3.2

Two security improvements can prevent Servers and Clients from connecting. The first is Windows XP **firewall settings on the helper/server**. By default, Windows XP firewall will prevent all DCOM communications (TCP port 135) without warning.

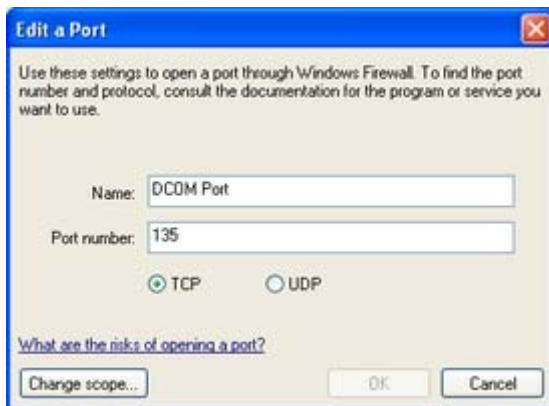
The second potential issue is a **DCOM permissions restriction on both server and client** which will cause DCOM to ignore callbacks coming from anonymous users. When a helper/server communicates with the initiating client, the server sends callbacks back to the client which may be block without warning.

4.3.2.1

On the Firewall, you should create an exception to allow communication with the TreeAgeDistributed server using DCOM, and setup the appropriate port for it. Open the Security Center in Control Panel and click Windows Firewall.

By default the Windows XP firewall is enabled. It is NOT recommended to disable the firewall, except for troubleshooting purposes.

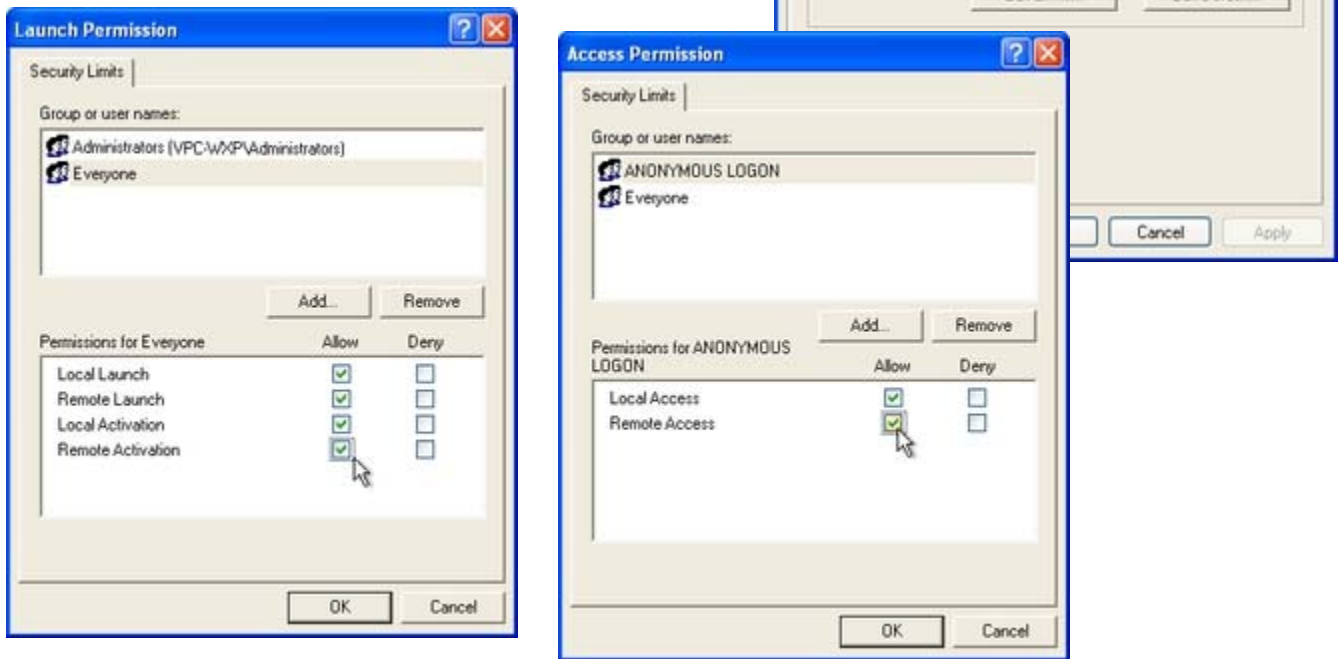
Click the "exceptions" tab. Add TCP port 135 to enable DCOM communications.



4.3.2.2

Open the DCOM Configuration Utility. (DCOMCNFG.EXE). Expand the Component Services tree node, right-click the My Computer icon and click Properties. Click the COM Security tab.

Under Launch and Activations Permissions, edit the limits and allow Remote Launch and the Remote Activation for the group containing the network user. (Everyone is the most inclusive group.)



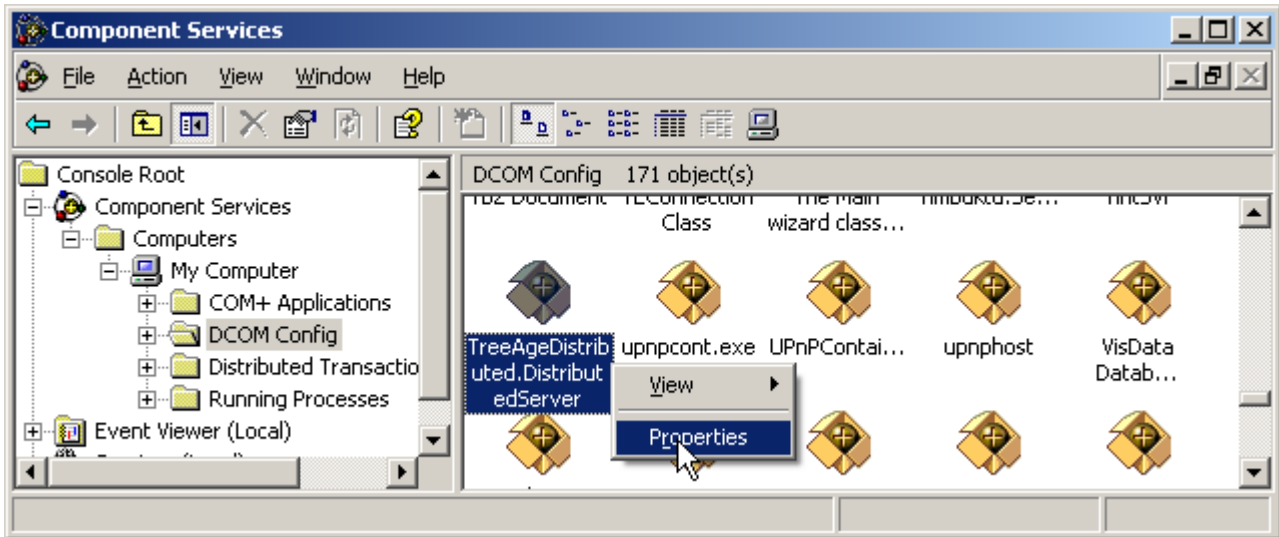
Under Access Permissions, allow Remote Access for the group containing the network user.

If the DCOM Authentication Level is None (e.g., peer-to-peer), then the ANONYMOUS logon will need to be allowed remote permissions.

Note that the Everyone group includes all authenticated users. You may wish to grant permissions to a smaller group of users.

4.3.3

Expand My Computer, and click on DCOM Config. TreeAgeDistributed should appear in the list of DCOM applications if it has already been installed. To set specific security permissions for the program, select it and click the Properties... button.



Give both launch and access permissions to the user (or group) that the client will use to connect to the helper computer.

4.3.4 Troubleshooting in Windows XP SP2

Common error codes from the **Connection Diagnostic client** when trying to test a remote connection to the TreeAgeDistributed server from a client (in a typical order of occurrence before successfully connecting):

Run-time error 429: ActiveX component can't create object.

(The TreeAgeDistributed and TreeAge Pro Interactive software may not be installed and/or licensed on the helper/server.)

Run-time error 462: The remote server computer does not exist or is unavailable.

(Under XP, Windows Firewall running on the helper/server or client can prevent the domain user/client from connecting. To allow DCOM communications, port 135 needs to be open for the local subnet. This port is also used by XP Remote Access.)

Run-time error 70: Permission Denied.

(For Peer-to-Peer networks, with computers not added to a domain: See the note under section 3 on setting the Local Security Policy for network logons to "Classic". For domain networks: In order for an XP client to initiate the communication with the XP helper/server, computer "limits" need to be raised for the to allow the client Remote Launch and Activation permissions, and the permissions for the TreeAgeDistributed server application need to allow Remote Launch and Activation.)

5. NOTES ON USERS LISTS AND TESTING

- On the client computer (i.e., where TreeAge Pro is installed), create a text file listing the names of possible helper computers on the network (see Usage, below).
- The Distributed Module installers adds a simple utility called "connection_diagnostic.exe" that may be of help in configuring and testing access to helper computers. Run the utility from the client, enter a helper computer name or IP address (including "localhost" to connect to the current computer), and click "Check". The test program attempts to connect to the DCOM server ("TreeAgeDistributed.exe") on the helper computer and will report any errors. (If you see "Error (70): Permission denied" contact TreeAge Software support, or refer to the troubleshooting guides at: <http://support.microsoft.com/default.aspx?scid=kb;en-us;180384>)
- Diagnostic connection information is also reported when you check the status of helper computers from TreeAge Pro via the Monte Carlo – Distributed Processing dialog.
