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ThinAnywhere® Server for Linux®
Installation and User's Guide



ThinAnywhere, Inc.

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Table of Contents

Table of Contents	3
Welcome to ThinAnywhere[®] Server for Linux[®]	5
CHAPTER 1	7
System Requirements	7
Client System Requirements.....	7
Server System Requirements.....	7
CHAPTER 2	8
Getting Started on Linux[®]	8
How to Prepare the OS for ThinAnywhere[®]	8
Understanding the Linux System Configuration for ThinAnywhere [®] :	8
OS Preparation:.....	8
Install and start License server:	9
CHAPTER 3	10
Installing ThinAnywhere[®] Server	10
Overview of installation steps on the server machine:	10
Install ThinAnywhere Server Software:	10
Configuring users for ThinAnywhere	11
CHAPTER 4	12
Connecting from the ThinAnywhere[®] Client	12
On the client machine:.....	12
Understanding the ThinAnywhere Client Session Login Box.....	13
Reconnecting to Disconnected Sessions.....	14
CHAPTER 5	14
Server Configuration and Management	15
Overview	15
Starting and Stopping the ThinAnywhere Server Software.....	15
Server Parameters (iip.ini file)	16
The iiplogin module	16
The iipsession module.....	18

The Xiip/XiipGL Server modules.....	21
The Access List module	22
CHAPTER 6	23
Network Security	23
Firewalls	23
Encryption	23
Virtual Private Network (VPN)	23
Outgoing Ports (on ThinAnywhere client machine)	23
Incoming Port (on ThinAnywhere server machine).....	24
CHAPTER 7	25
Running 3D OpenGL Applications	25
Software Rendering	25
Hardware Rendering.....	25
CHAPTER 8	27
Load Balancing	27
Overview	27
Implementation	29
LDAP usage with load balancing	32
Administrator View	34
Optional Load Balance Statistics Package.....	34
ThinAnywhere Load Balancing Extension Quick Start Guide.....	35
CHAPTER 9	37
Troubleshooting.....	37
CHAPTER 10	40
Product Support.....	40
Reporting Procedures	40
Contacting ThinAnywhere	40

Welcome to ThinAnywhere[®] Server for Linux[®]

What is ThinAnywhere?

- ◆ ThinAnywhere is a thin client software technology that enables people to connect to their applications from anywhere in the world – whether between office desktop and high-speed computers in the server room, or remotely from a completely different location. ThinAnywhere[®] allows you or your customers to connect securely over the Internet.

Key Features of ThinAnywhere

- ◆ Uncompromised Security
 - Enjoy military-quality AES encryption, optionally bundled with industry standard SSL encryption.
- ◆ Full Network Access
 - Both you and your customers can freely connect from any location that allows standard TCP port access.
- ◆ Easy Network Configuration
 - If your IT department or ISP can set up access to a secure web server, then they can easily configure your network for ThinAnywhere[®].
- ◆ Environment Variables
 - ThinAnywhere[®] environment variables are passed from the client directly to the ThinAnywhere server and are a powerful tool to help administrators customize server functions when used with web-based login and load balancing.
- ◆ Statistics
 - ThinAnywhere[®] can produce improved user activity logs. Information includes: User Name, Connection Address, Times and Duration. The Enterprise Edition also includes a Load Balance Statistics package to allow administrators to identify and resolve usage issues.

What is Server Based Computing

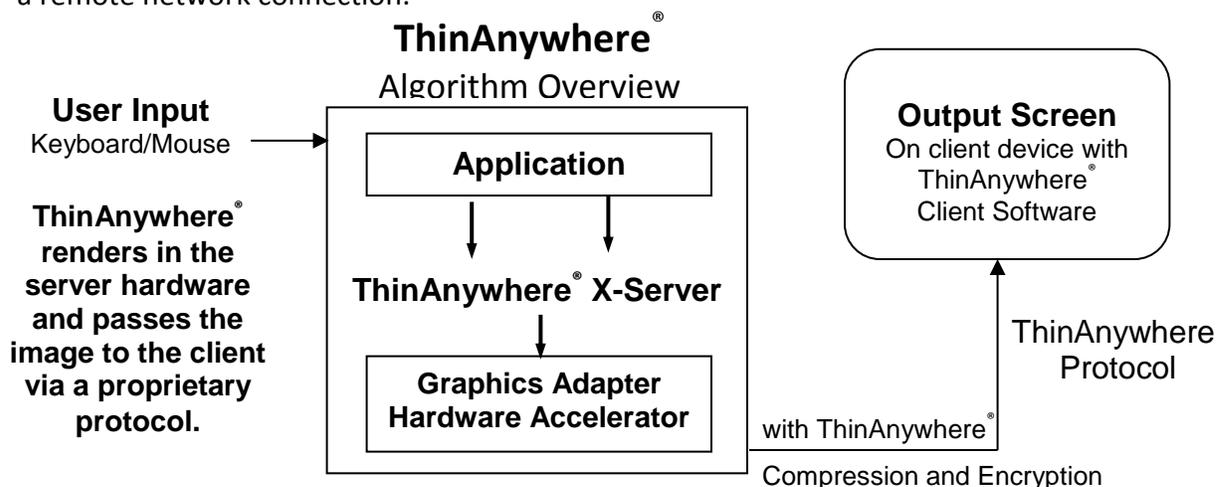
- ◆ ThinAnywhere[®] server-based computing is an architecture that enables the delivery of Linux applications to the end-user no matter where they are. With this architecture the applications are installed and run on the central server, allowing the end-user can access applications via the local network or remotely over the Internet.
- ◆ The Benefits of Server Based Computing
 - Central installation and management of applications and data. Changes and updates to applications only have to be made once on the central server and the benefits are instantly available to everybody.
 - Allows for the most effective utilization of computer hardware. Because the applications are run on the application server the hardware requirements of the client machine are minimal, extending the useful life of the existing hardware.

Who should use this Manual?

- ◆ This manual is designed for a system or network administrator having at least a minimal knowledge and experience with Linux[®] or Unix[®].
- ◆ It should be used in assisting with the installation, configuration, management, and maintenance of a ThinAnywhere[®] enabled network.
- ◆ It also clearly explains the impact ThinAnywhere[®] has on key administrative issues such as network security and Total Cost of Ownership.

How does ThinAnywhere[®] work?

By utilizing a multi-stage compression on the Linux[®] application computer, ThinAnywhere[®] allows the users to experience enhanced accelerated performance over a remote network connection.



CHAPTER 1

System Requirements

Client System Requirements

Graphics Adapter:	Any current standard graphics adapter.
Number of NICs:	Minimum of 1
Operating System:	Microsoft Windows 10 or Windows Server versions (Windows 7 & 8.x are still supported as well.)

Server System Requirements

Hardware should be capable of running the Linux® OS and giving reasonable performance for desired application(s).

CPU Type	x86 (32-bit) or x86_64 (32/64-bit) Intel® or AMD® processor
CPU Speed	1.8 GHz or greater
Number of CPUs	2 or more logical CPUs (4+ is better)
RAM	Sufficient to run OS and applications properly
Hard Disk	Sufficient to run OS and applications properly
Graphics Adapter	Any adapters sufficient to run applications properly on the system console.
Number of NICs	Minimum of 1
Operating Systems	RedHat Enterprise Linux® 6.x/7.x, CentOS 6.x/7.x or similar

**** Note:** Please install all the latest security patches if this machine is to be available from the Internet. **

IMPORTANT NOTICE!

- ThinAnywhere requires 64-bit and 32-bit OS packages. Some OS packages require a corresponding 64-bit package for each 32-bit package installed.
- Using “yum” to install the ThinAnywhere packages will automatically generate a list of prerequisite packages and give you the option to install those packages.

WARNING: Check with your system administrator before adding OS packages to any production systems.

CHAPTER 2

Getting Started on Linux[®] ... How to Prepare the OS for ThinAnywhere[®]

Understanding the Linux System Configuration for ThinAnywhere[®]:

NOTE: Please be aware of the following points of information before installing the ThinAnywhere server software:



- ThinAnywhere is designed to run on headless servers and will **require the runlevel** of the server to **runlevel 3** (RHEL 6), or the **multi-user target** (RHEL 7).
- ThinAnywhere defaults to KDE (if installed), then Gnome if KDE is not installed.. The default desktop can be set by changing the configuration settings in the following file: **/opt/IIPServer/mit/iipstartupglobal.sh**
- ThinAnywhere uses the 32-bit packages for compatibility. It will require the installation of the “.i686” packages. Using “yum” will automatically install these.
- Port 27500 (TCP) will need to be opened in local the firewall software (if installed).

OS Preparation:

- Server name must be properly set up in DNS or NIS.
If not, make sure machine name and IP address are in /etc/hosts
- Open Firewall for the following TCP ports: 27500, 27007, 27700

(For RHEL7.x)

If running “firewall-cmd”, run the following commands:

```
firewall-cmd --permanent --add-port=27500/tcp
firewall-cmd --permanent --add-port=27007/tcp
firewall-cmd --permanent --add-port=27700/tcp
```

The firewall can then be restarted with the command:

```
systemctl restart firewalld.service
```

(For RHEL 6.x and earlier)

If running “iptables”, the following lines may be added to `/etc/sysconfig/iptables`:

```
-A INPUT -m state --state NEW -m tcp -p tcp --dport 27500 -j ACCEPT
-A INPUT -m state --state NEW -m tcp -p tcp --dport 27007 -j ACCEPT
-A INPUT -m state --state NEW -m tcp -p tcp --dport 27700 -j ACCEPT
```

The firewall can then be restarted with the command:

```
service iptables restart
```

- Allow ThinAnywhere sessions to access the GPU drivers:

Add the line “xhost +” to the file `/etc/gdm/Init/Default`. The line should be added just before the “sysresources=...” line... as follows:

```
xhost +
sysresources=/etc/X11/Xresources
```

- The server system should also have the GPU and nVidia driver installed – **including 32-bit library support.**

NOTE: The mesa-libGL packages may reset the links to “`/usr/lib/libGL.so`” and “`/usr/lib64/libGL.so`” that were generated by the nVidia driver installation. If these packages were installed after the nVidia driver, please check the links (below) or reinstall the driver.

```
/usr/lib64/libGL.so -> libGL.so.1
/usr/lib/libGL.so -> libGL.so.1
```

Install and start License server:

- Install the ThinAnywhere FLEX licensing manager bundle.
The bundle includes a temporary demonstration license.

```
yum install redhat-lsb.i686
yum install tawflexlic-X.X-X.elX.i686.rpm
```

- Start the license manager software:

```
cd /opt/IIPServer/flexnet
./S90lmgrd start
```

- Check the license status:

```
/opt/IIPServer/flexnet/lmstat -a
```

It will report information about the license server and should contain a line similar to this:

```
Users of taw_server: (Total of 5 licenses issued; Total of 0 licenses in use)
```

CHAPTER 3

Installing ThinAnywhere[®] Server

Overview of installation steps on the server machine:

- Download and install the ThinAnywhere[®] Server RPM on the server machine.
- On RHEL 7, the RPM installation will start the server software automatically.
- On RHEL 6, the server will need to be started as noted below.

Install ThinAnywhere Server Software:

- Install the ThinAnywhere Server for Linux bundle.

```
yum install tawiipserver-XX.X-X.elX.i686.rpm
or
rpm -Uhv tawiipserver-XX.X-X.elX.i686.rpm
```

- The ThinAnywhere server software should start automatically on RHEL 7. If it does not, or you are using RHEL 6, please run the following command:

```
tawserver start
```

- Check the status: (press “q” to quit)

```
tawadmin
```

It should display something similar to the lines below:

```
----- ThinAnywhere Login Statistics -----
Commands: h=Help Screen, t=Toggle Screen, s=Seconds to update,
d=Disconnect, k=Kill Session, q=Quit
User Logon-Time S Disp S-ID Type ShmIDPeer-Address:Port

Available licenses: 1
```

The ThinAnywhere software is now ready to use. Please install and run the ThinAnywhere client bundle (ThinSetup_xxx.msi) on your client machine to make the remote connection.

See Chapter 4 on *Connecting from the ThinAnywhere Client* to get started connecting remotely. Please refer to the ***ThinAnywhere Client User's Guide*** for more details.

Configuring users for ThinAnywhere

By default, all users accounts on the server will use the following start-up script when logging in remotely via ThinAnywhere:

`/opt/IIPServer/mit/iipstartupglobal.sh`

If you would like to configure a user to have a different start-up script, copy the script above to the following location:

`${HOME}/.iipstartup`

Please make sure the script can be executed by that user and modify it as desired.

When the ThinAnywhere session starts, the script is executed. When the script finishes, the ThinAnywhere session logs out.

In most cases, the script contains an "exec" command followed by one of the standard Linux desktop commands, such as:

`exec /usr/bin/gnome-session` *(for Gnome desktop)*

OR

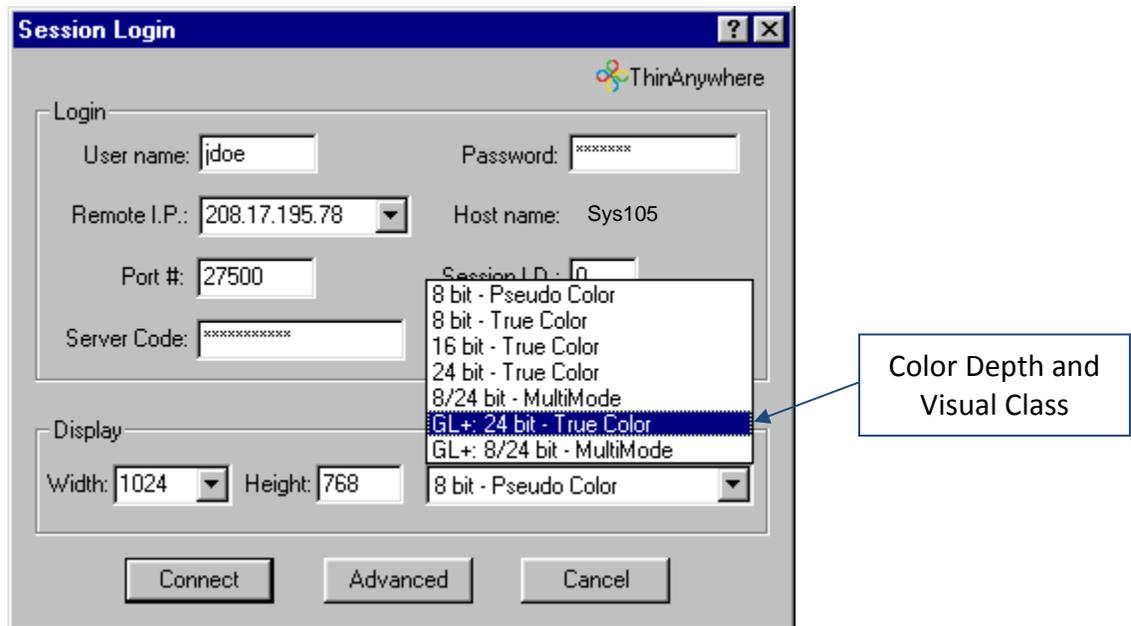
`exec /usr/bin/startkde` *(for KDE desktop)*

CHAPTER 4

Connecting from the ThinAnywhere® Client

On the client machine:

- Download and install the ThinAnywhere client MSI on the client machine.
- Start the ThinAnywhere client.
- Fill out the User name, Password, and Remote IP (or system name) boxes.
- Select a width and height that match the server screen capabilities. The color mode should be GL+ 24-bit (the default for newer versions of the client).
- Click “Connect”



NOTE: Please see the *ThinAnywhere Client User's Guide* publication for more detailed information.

Understanding the ThinAnywhere Client Session Login Box

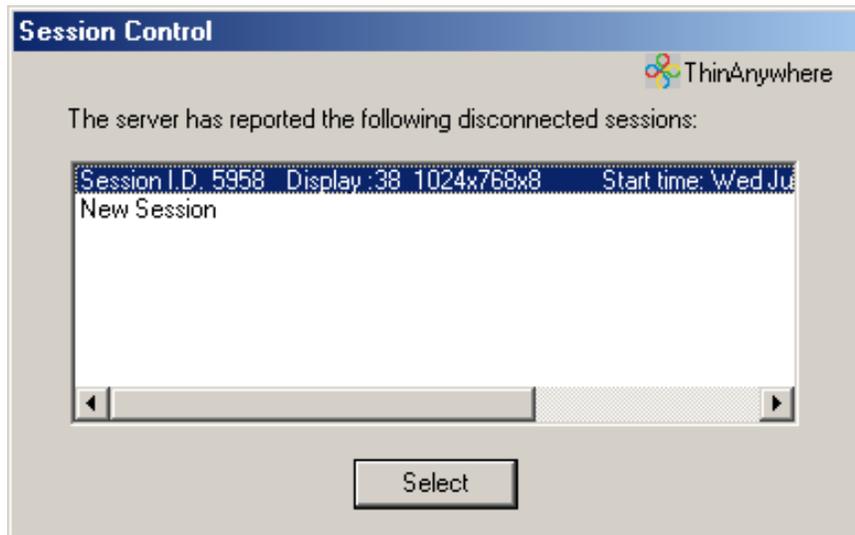
The screenshot shows the 'Session Login - Version: x.x.x.x' dialog box. It is divided into 'Login' and 'Display' sections. The 'Login' section includes fields for 'User name' (containing 'username'), 'Password' (masked with '*****'), 'Remote I.P.' (a dropdown menu with 'server-address'), 'Host name', 'Port #' (set to '27500'), 'Session I.D.' (set to '0'), 'Server Code', and 'Bandwidth' (a dropdown menu with 'Medium'). The 'Display' section includes 'Width' (set to '1600'), 'Height' (set to '1200'), 'GL+' (set to '24 bit - True Color'), and checkboxes for 'Use Full-Screen Mode' and 'Use Seamless Windowing Mode'. At the bottom are 'Connect', 'Advanced', and 'Cancel' buttons. A help icon '?' is in the top right corner.

Annotations and instructions:

- Type in your user name.
- Type in the IP address/name of the server you want to connect to.
- Port 27500 is the default value. If you encounter problems logging into a server contact your administrator to verify what port ThinAnywhere is running on.
- Server Code is an optional parameter that acts as another password to log into the server and also changes the encryption key.
- Select from defaults or type in the width and height of the screen size that you want.
- Click the OK button to login to the server.
- Type in your password.
- For Client HELP, click on the "?" and then click on the word ThinAnywhere below and the help interface will appear.
- The host name appears here if it is in the **taw.ini** file.
- To collaborate with a user already logged into a server with ThinAnywhere, ask the user what their session ID is and type it into this box. Otherwise leave it as 0 if you are not trying to collaborate.
- Select the bandwidth for the type of connection you are using. Also see "Changing Compression Types".
- Select the Color Depth and visual class that you want the display to be set to.
- Click the Advanced button for advanced login options such as: Xdmcp, RDP and iIP or SSL (Secure Socket Layer) Protocols.
- Click the Cancel button to cancel the session login.

Reconnecting to Disconnected Sessions

If you have any disconnected sessions on the server that you are logging into then a window with a list of those sessions will appear. You can select one of the previous sessions and reconnect to it or you can select "New Session" to start a new session.



CHAPTER 5

Server Configuration and Management

Overview

- ◆ The ThinAnywhere Server package consists of several modules. Below are some modules you may see in the process table when users create sessions:
 - **iiplogin:** Handles login procedures (username, password). This program continuously runs and will be started automatically with the S92iiplogin script. This program listens on port# 27500/TCP (by default) for incoming client connections. Port# 27500/TCP must be opened up on your firewall before a client connection can be made.
 - **iipsession:** Handles session control. This program is started by iiplogin and is active only when a session is connected.
 - **Xiip/XiipGL:** The ThinAnywhere Xserver. This program is started by iiplogin and is active for connected and disconnected sessions.

Starting and Stopping the ThinAnywhere Server Software

- ◆ Starting the server software.
 - As root or super-user on the ThinAnywhere Server, type the following on the command line: **/usr/local/bin/tawserver start**

```
tawserver start
```

- ◆ Stopping the Server software.
 - As root or super-user on the ThinAnywhere Server, type the following on the command line: **/usr/local/bin/tawserver stop**

```
tawserver stop
```

- ◆ Automatic Startup of ThinAnywhere.
 - When the software is installed on the system, startup scripts such as the S92iiplogin are copied into the directories /etc/rc3.d and /etc/rc5.d so that ThinAnywhere is automatically started upon booting the server.

Server Parameters (iip.ini file)

- ◆ Configuration of ThinAnywhere modules (iiplogin, iipsession and Xiip/XiipGL) is done through the /opt/IIPServer/bin/iip.ini file. Some parameters (particularly for iiplogin) require a restart of the server to take effect. This can be accomplished with the start and stop commands described above.
- ◆ *The following information is intended for a ThinAnywhere administrator. Please refer to this document and any comments in the iip.ini file itself before attempting to modify the parameter values on the server.*
- ◆ **WARNING: Most of these parameters are set for optimum performance by default. We do not recommend changing these unless necessary.**

The iiplogin module

[iIPLogin]

ListenPort 27500

This is the port number that the iiplogin program will listen on for incoming display connections. This port must be opened up on the firewall <incoming only>.

Default of 27500.

ExePath /opt/IIPServer/bin

This is the path to the bin directory where the iIP software resides.

Default of /opt/IIPServer/bin.

XiipPortMin 27830**XiipPortMax** 27899

Port number range (min, max) that will be assigned for new connections.

XiipDisplayMin 30**XiipDisplayMax** 99

Display number range that will be assigned for new connections.

i.e. Hostname:<display number>. Valid range is 10 -> 999.

DisplayPrefix

On some platforms the host name or an alias may not be known on the X server. When this occurs, add the hostname here and this will be used for the DISPLAY value.

Default of <blank>.

ServerCode

A 16 character security code set by the administrator. This will allow only authorized users to connect to the server. The Server Code option on a ThinAnywhere client must match this code to establish a connection. This option is read every time a new connection is made.

Default of <blank>.

ImmediateDeny 1

When a remote client is denied a connection due to permissions from the access list, the server sends back a status and an error message. If ImmediateDeny is "1", no messages are sent back and the socket is default of 0.

LogFile /opt/IIPServer/logs/iiplogin.log

The path and file name of the log file. All three programs (iiplogin, iipsession and Xiip write to this file).

LogSize 1000000

The maximum limit that the file will be allowed to grow.

TruncateSize 500000

The truncate limit of the file.

ProtocolType 0**SSLCertificate /opt/IIPServer/licenses/server.pem****PrintDebug 0**

For debugging purposes and should be set to "0".

The iipsession module

[iIPSession]

AddFontPath

ThinAnywhere server (Xiip) looks for standard fonts located on the system. If there is an additional font path to use, add the path on this line.

Default of <blank>.

MaxXOpenRetry 2

This value represents the number of times a session will try to connect or reconnect to the Xserver.

Default of 2

#XdmcpFromAddr

IdleTimeout 0

This parameter specifies the number of minutes a connection can stay at idle before the session is broken. Used in conjunction with DiscOnIdle

Default of 0.

LBMsgSzLimit 100

Low bandwidth message size limit. This parameter is only valid on client low bandwidth connections. During a low band connection, messages are compressed using several methods. Messages with a size smaller than "LBMsgSzLimit" will only be compressed using the standard method. Smaller values may use more CPU cycles but bandwidth usage is lower. For extremely slow connections, and for the lowest bandwidth possible, set LBMsgSzLimit to "1", ScreenNParts to "1" and the "Bandwidth" parameter on the client to 5.

Default of 100.

DiscOnError 1

This parameter controls disconnect status of a session if a non-recoverable error occurred in communication.

Default of 1.

DiscOnIdle 1

The session is disconnected after IdleTimeout is reached. This parameter has no effect if the IdleTimeout value is 0.

Default of 1.

IdleFPS 20

Idle frames per second. This value represents the sample timeout value for sampling the Xserver for screen updates. For example, a value of 20 would yield a 50ms delay in checking the server for updates. Note that increasing this value will significantly increase CPU overhead.

Default of 20.

ActiveFPS 40

Active frames per second. This value represents the sample timeout value for sampling the Xserver during active screen updates. For example, a value of 40 would yield a 25ms delay in checking the server for updates after an update already occurred. This parameter is useful for tuning animation applications. Note that increasing this value will significantly increase CPU overhead.

Default of 40.

ClbIdleFPS 20

Idle frames per second. This value represents the sample timeout value for sampling the Xserver for screen updates. For example, a value of 20 would yield a 50ms delay for checking the server for updates. Note that increasing this value will significantly increase CPU overhead. This value is for collaboration only.

Default of 20

ClbActiveFPS 40

Active frames per second. This value represents the sample timeout value for sampling the Xserver during active screen updates. For example, a value of 40 would yield a 25ms delay in checking the server for updates after an update already occurred. Note that increasing this value will significantly increase CPU overhead.

This value is for collaboration only.

Default of 40

SendBufSz -1

This value is used to set the SO_SNDBUF option size for socket write operations. If SendBufSz is -1, a default value from the O.S. will be used. On slow links, performance may be increased by lowering the value. On fast links (LAN), a low value may be used to decrease CPU usage without a serious performance penalty. This value must be the nearest power of 2. Note that increasing this value will increase CPU usage for the session.

Default of -1.

MaxXOpenRetry 2

This value represents the number of times a session will try to connect or reconnect to the Xserver.

Default of 2

CheckInterval 5000

This value sets the internal polling timer in microseconds for Originator sessions only.

Default of 5000

ISPHeartBeat 1

This value sets the number of seconds that the server sends a "packet" of data (time in seconds of server clock). This feature is very useful when an ISP disconnects the line when no activity is detected.

LogFile /opt/IIPServer/logs/iipsession.log

The path and file name of the log file. All three module types (iiplogin, iipsession and Xiip/XiipGL write to this file).

PrintDebug 0

For debugging purposes and should be set to "0".

The Xiip/XiipGL Server modules

[Xiip]

Lock8BitCell 0

Locks one 8 bit color cell. This parameter is available for 8 bit pseudo color only. Set this parameter to a "1" when a color appears to be missing or "transparent".
Default of 0.

LogFile /opt/IIPServer/logs/xiip.log

The path and file name of the log file. All three programs (iiplogin, iipsession and Xiip write to this file).

CheckInterval 5000

This value sets the internal polling timer in microseconds for Originator sessions only.
Default of 5000

Def824Visual 4

This value sets the default visual class for the Xserver and is valid only for 8/24 MultiMode.

4 = True Color. Forces a 24 bit default depth under 8/24 MultiMode.

3 = Pseudo Color. Forces an 8 bit default depth under 8/24 MultiMode.

Default of 4

ColorMaskFlag 0

This value sets the RGB value of the Xserver. This parameter is only valid under 24 bit and 8/24 bit MultiMode.

0 = ff000/ff00/ff Linux RGB order.

1 = ff/ff00/ff000 SUN/SGI RGB order.

Default of 0

PrintDebug 0

For debugging purposes and should be set to "0".

The Access List module

[AccessList]

This section is used for Allowing or Denying I.P. addresses. The default action of a blank [AccessList] section is to allow all. If the section is missing or corrupted, the default action is to deny all. The maximum number of entries is 1024. If *BOTH* "Allow" and "Deny" exist in the section, the default action is to deny all others. Default of <blank>

Syntax:

Allow 192.167.3.23 #Allow only this I.P. Default action to deny all others.
Deny 192.167.3.45 #Deny only this I.P. Default action to allow all others.

[RemoteControlHosts]

ALLOW 127.0.0.1

ALLOW 000.000.0.000 (Insert your static IP address)

This section is used to specify which computers are allowed to request ThinAnywhere admin information from this server. Please be sure to include an ALLOW line for "localhost" (IP address 127.0.0.1) and any IP addresses assigned to this server.

NOTE: If using load balancing, please also include an ALLOW line for the IP address of the load balancing server.

CHAPTER 6

Network Security

ThinAnywhere only requires a single TCP port (27500 by default) to allow the remote connection.

Firewalls

In order to access a ThinAnywhere® enabled server that is behind a firewall, the administrator will need to add incoming permissions for the software to operate properly. We strongly suggest that the server machines are assigned to static IP addresses.

Encryption

ThinAnywhere® uses AES encryption for network communication between the server and the client machine.

Virtual Private Network (VPN)

- **What's a VPN?**
A Virtual Private Network (VPN) creates a secured private network connection when accessing the Internet over a publicly accessible infrastructure. They typically employ a combination of software and/or hardware technologies to provide security to any data traffic they carry.
- **Is ThinAnywhere compatible with VPNs?**
ThinAnywhere will work seamlessly inside of a VPN connection. There are numerous solutions to implementing a VPN, including both hardware and software solutions. It is recommended that any VPN solution be selected based on what is best for the corporate network.

Outgoing Ports (on ThinAnywhere client machine)

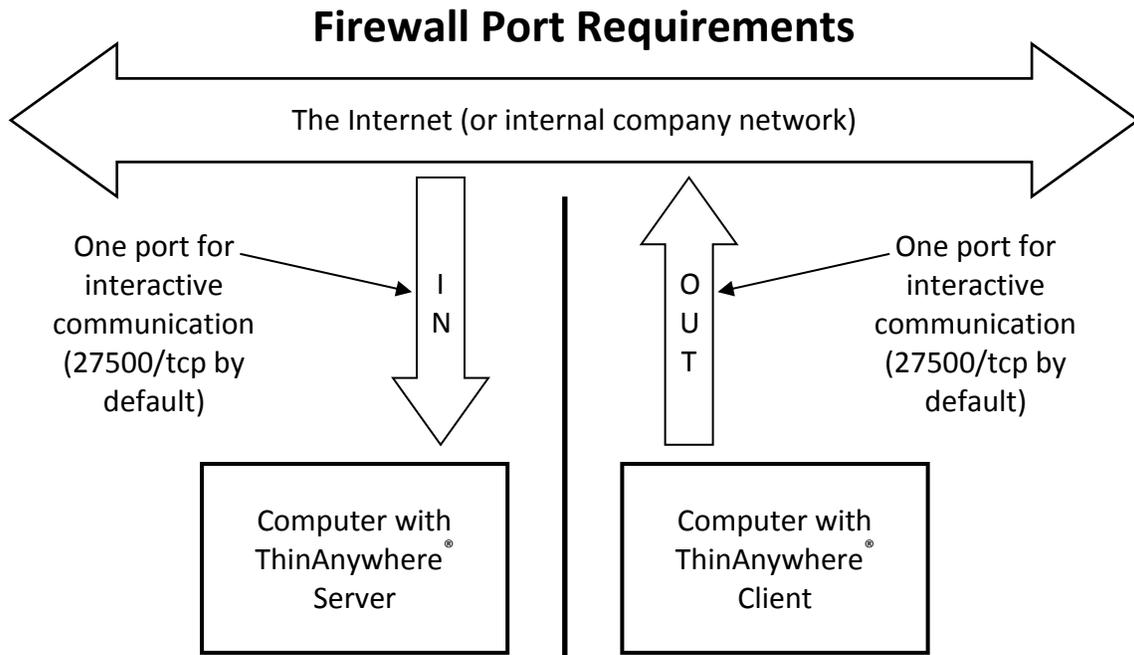
For ThinAnywhere clients to access a ThinAnywhere® enabled server outside their local networks, outgoing permission must be granted on a single TCP port: 27500 (or the port configured on the ThinAnywhere server in the iip.ini configuration file).

All data sent over the network or Internet will be encrypted using ThinAnywhere encryption methods.

Incoming Port (on ThinAnywhere server machine)

In order to access the ThinAnywhere[®] enabled server through a firewall the following changes must be made:

1. The application server must have a public (preferably static) IP addresses. This can be set within the firewall using Network Address Translation (NAT) or Port Address Translation (PAT)
2. The port the ThinAnywhere server is configured for (usually 27500/tcp) must be opened in the firewall. It is highly recommended as many ports as possible remain closed.



CHAPTER 7

Running 3D OpenGL Applications

Software Rendering

Although ThinAnywhere has built-in software rendering support for 3D OpenGL, most OpenGL applications will perform much better using hardware rendering. It is recommended to configure your server with a video adapter that supports OpenGL under Linux and use one of the hardware rendering options described in the section below. The instructions at the beginning of this manual include details to enable the console session to allow ThinAnywhere access to the video drivers.

If you would still like to use software rendering for OpenGL applications, please log on using the "24-bit True Color" setting. (16-bit True Color and 8-bit Pseudo Color options are still available for very old legacy applications.)

Hardware Rendering

Standard GL+ Mode Hardware Rendering

A properly configured ThinAnywhere server will automatically support hardware rendering for OpenGL applications when a user logs on via the GL+ 24-bit color mode. Multiple user sessions will share the video adapter that is configured for the console.

Once a GL+ session is started, a user may test hardware rendering availability by opening an X-term and typing "glxinfo". The "OpenGL Renderer" information should match the information returned when running "glxinfo" directly on the console of the machine. However, the specific extensions and video modes will vary somewhat.

NOTE: Some versions of the OS and desktop work best with GL+ mode using a special direct-render software rendering mode. Full hardware rendering is then accomplished via the Fast Render Extension (below) or, for Java3D and certain OpenGL apps, use of the ThinAnywhere tawlibt64 package.

ThinAnywhere Fast Render Extension

A. Requirements for OpenGL applications to use Fast Render (libTawGL)

Most OpenGL applications will benefit from Fast Render. Fast Render makes more OpenGL extensions available to the application and shortens the time it takes an application to communicate with the ThinAnywhere server.

However, **Fast Render requires that the applications using it reside on the same machine as the ThinAnywhere server software.** Applications being run remotely from other machines (via setting the "DISPLAY" environment variable for X11/GLX) cannot use the Fast Render feature.

Fast Render also requires the user to log in to a **GL+ 24-bit session.** (8-bit and 16-bit sessions are NOT supported.)

B. How to enable an applications to use Fast Render

Fast Render may be enabled any time by using the "source" command to set up the environment of the ThinAnywhere session. However, it is recommended that a user does NOT put this command in his or her log-in scripts, but rather in the start-up script of the specific applications.

If Fast Render was not fully configured on your system, please run the installation script as described in the next section.

1. Log on to the ThinAnywhere server using GL+24 mode.
2. Depending on the type of application start script, add the following line to the start script:
 - a. If in a C-shell: `source /opt/IIPServer/mit/setuptawgl2.cshrc`
 - b. If BASH: `source /opt/IIPServer/mit/setuptawgl2.bashrc`*(NOTE: If you do not run step 2, it will not properly implement the Fast Render option of ThinAnywhere.)*
3. Start the application. The log file should show ThinAnywhere(R) 3D (32-bit) or ThinAnywhere(R) 3D (64-bit) - depending on the type of application.
4. For testing purposes, the appropriate "setuptawgl2.*" file could be sourced from an X-term in the ThinAnywhere session before starting the application from that X-term. The user could then test several applications to verify their compatibility with Fast Render.

CHAPTER 8

Load Balancing

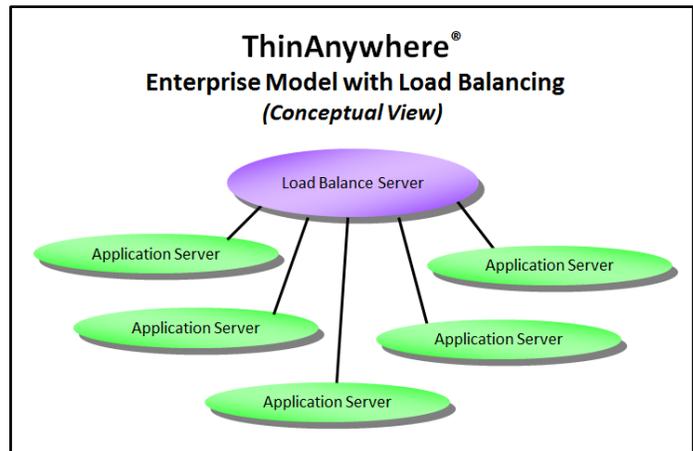
Overview

Conceptual View:

Below is a conceptual view of the Load Balancing system. Each application server reports its load to the Load Balancing Server to which it has been assigned.

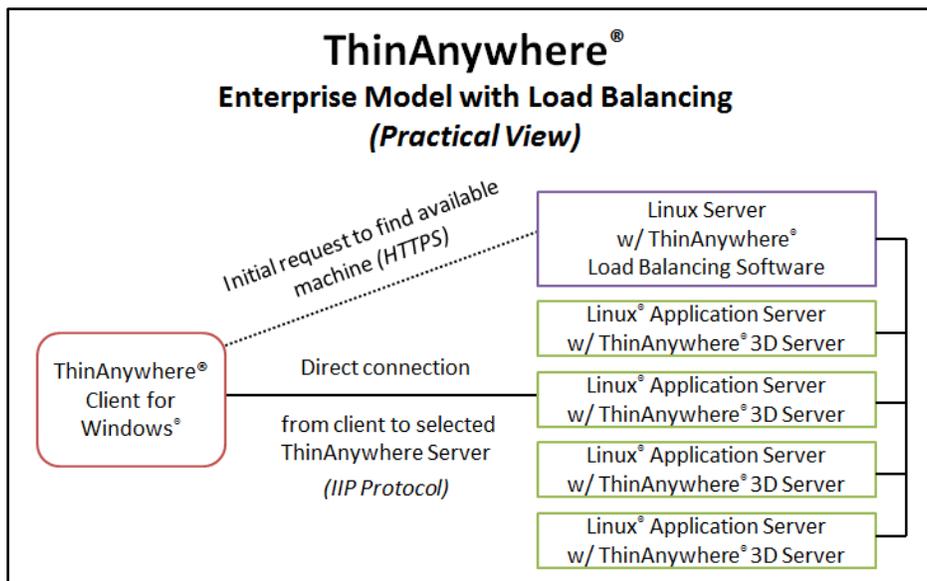
During a log-in request, the Web Log-In Interface (via the apache web server and PHP) contacts the Load Balancing Server to find which ThinAnywhere server is available.

Availability is based on the amount of "weight" given to a particular attribute. All the attributes of the systems are weighted and sorted to find the best match.



Practical View:

Below is a practical diagram showing that each application server is also a ThinAnywhere server. The Linux Server at the top (colored light purple) would be running the ThinAnywhere Load Balancing Server module (tawlbgts) and usually also the Apache Web Server and the Load Balancing Interface (tawlbggetsys).



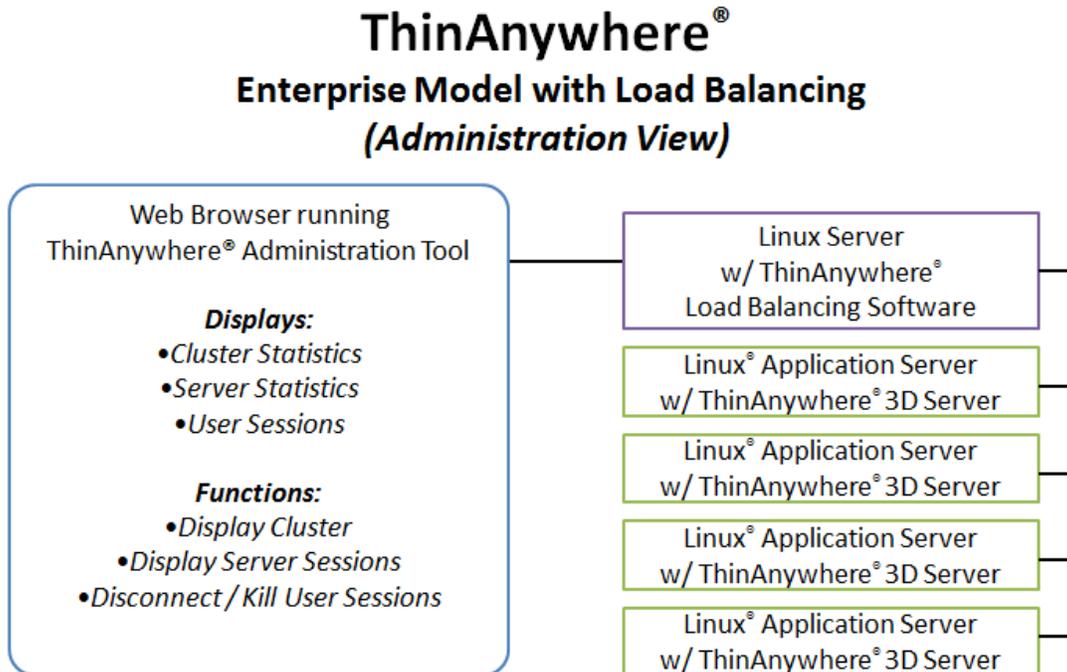
The user would initiate the connection via a web page. The web server then contacts the Load Balancing Server and receives the IP address of the available Application Server to present to the user.

When the user clicks the "Connect" button on the web page, the local browser starts the ThinAnywhere Client software and passes all the server information to it. A connection is made directly between the ThinAnywhere Client machine and the Application Server which is running ThinAnywhere Server software.

Administration View:

ThinAnywhere Load Balancing includes additional web-based tools to manage the ThinAnywhere Servers in the Load Balancing cluster.

These tools include display of cluster, server and user session statistics. The system administrator will be able to view and manage user sessions from a web browser.



Application Servers which do not report when expected will be marked as critical. Statistics for each server may also be sorted to find machines which have unusually heavy loads.

Implementation

The load balance options are only available through a web-based login. The login allows users to choose between login into an applications server chosen by the load balance feature, or as a collaborator only.

The end users always log in through the ThinAnywhere Load Balance authentication server. This server performs the following functions:

- Serves web pages to end user for log in. (Web-based log in is a requirement if the load-balancing extension is installed.)
- Authenticates user (if using LDAP) during the log in process.
- Checks users permissions (if using LDAP) to help determine load-balancing algorithm to use.
- Receives current load information from each application server.
- Calculates appropriate applications server to use based on load. If using LDAP, additional parameters about the end user may be retrieved from the database and used to help determine the appropriate applications server.
- Opens a socket between end user and applications server. After authentication the user is connected directly to the application server and will no longer be connected to the authentication server.

Note: The job of the “authentication server” may be split between a separate web server and load-balancing server. In any case, the LDAP server may also be a separate machine.

Receiving current load information

Current load information is received by the authentication server every 15 seconds. The following information shall be passed to the authentication server:

- | | |
|---------------|--|
| ◆ NCPUS | - Number of CPU's in system |
| ◆ NSSESSIONS | - Number of current users |
| ◆ N3DSESSIONS | - Number of current 3D users |
| ◆ CPULOADAVG1 | - Average load of CPUs measured in last 1 min |
| ◆ CPULOADAVG5 | - Average load of CPUs measured over last 5 min. |
| ◆ FREEMEM | - Free memory on system |
| ◆ PAGEACT | - Amount of page swapping |

Calculating current load

What criteria determines when a system is loaded can be very subjective. Therefore the administrator may define the exact weights of each component. The weight calculation allows for the administrator to use one or more of the criteria and to define the weight for each.

If load balancing is chosen the web based login will call the following function and an applications server shall be chosen from those available:

Parameter Setup

Function Name

tawlbgetsys - ThinAnywhere Load Balance Get System

Synopsis

```
tawlbgetsys -x wght -x wght -x wght ... server  
tawlbgetsys -x wght -x wght -x wght ... server:port
```

Where "-x" is a valid option (see below) and "wght" is the percentage of the weight to be applied (0 - 100) to the value referenced by the given option.

Description

Return the IP address of the system that best fits the criteria given on the command line. Values not specified on the command line will not be checked when selecting the best fit. Percentages must be between 0 (the same as if it was not specified) and 100 inclusive.

If two or more systems match all of the criteria equally, one of those systems will be randomly selected as the best fit.

As many options as desired may be placed on the command line. Duplicate options will overwrite the previously defined value.

- c (NCPU)
Number of CPUs in server
Largest value gets highest priority.
- s (NSESSIONS)
Number of TAW sessions
Smallest value gets highest priority.

- t (N3DSESSIONS)
Number of 3D (OpenGL) TAW sessions
Smallest value gets highest priority.
- 1 (CPULOADAVG1)
CPU load average over last 1 minute
Smallest value gets highest priority.
- 5 (CPULOADAVG5)
CPU load average over last 5 minutes
Smallest value gets highest priority.
- m (FREEMEM)
Amount of free memory (RAM) in server
Largest value gets highest priority.
- p (PAGEACT)
Amount of paging activity in server
Smallest value gets highest priority.

Function Output

A single IP address is output to standard output. If an error occurs, the keyword "ERROR:" followed by a text error message string is output instead of the IP address.

Examples

Select the machine with the lowest 5-minute load average:

```
tawlbgetsys -5 100
```

Select the machine with the least number of sessions and the lowest 1-minute load average. Place 100% importance on the load average and only 50% importance on the number of sessions:

```
tawlbgetsys -s 50 -1 100
```

Usage and Application

This command may be called from within PHP pages or CGI scripts from the web server. The IP address output can be returned to the browser within an IIP file for the ThinAnywhere client to use during connection. Please see the following example pages included in the load-balancing extension bundle:

Standard (non-LDAP) Log In: /opt/IIPServer/tawlb/examples/index.php

LDAP Enabled Log In: /opt/IIPServer/tawlb/examples/ldap_auth.php

LDAP usage with load balancing

Login Screen

The load balance function works with or without LDAP. In either case, the “tawlbgetsys” function (documented above) will return the IP address of the “best fit” machine based on criteria given it within the PHP web page.

LDAP Method:

If using LDAP, the user name and password must be filled out in an initial log in page. The user can also select the type of session he wishes to log in to (load-balanced, XDMCP, collaboration).



Once “Submit” is pressed, the user name and password are verified against the LDAP entry and passed to the next log in screen. The user need only click “Submit” to log in to the applications server, or he may change the additional settings as desired.

NOTE: *If not using LDAP*, below is the initial screen that the user will see. The user will still enter the user name and password, but the ThinAnywhere server will verify the information during the actual connection to the server.

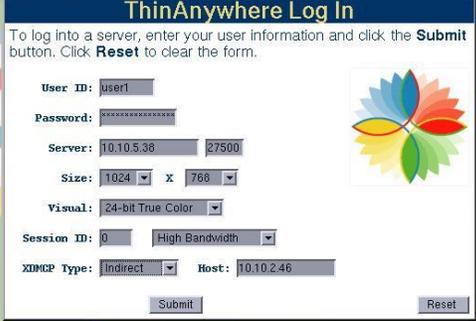


XDMCP (Legacy Support)

Users wishing to use the XDMCP feature (which will bypass load balancing) can do so by choosing the appropriate method and entering the machine host name if required by the XDMCP method. The user name and password are filled out from the previous page.

Both were verified against the LDAP entries.

Powered By ThinAnywhere



The screenshot shows a web form titled "ThinAnywhere Log In" with the following fields and values:

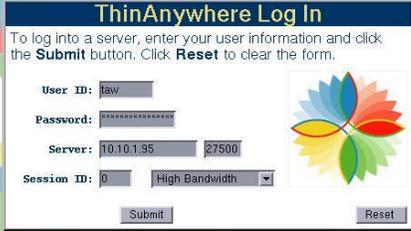
- User ID: user1
- Password: [masked]
- Server: 10.10.5.30 | 27500
- Size: 1024 x 768
- Visual: 24-bit True Color
- Session ID: 0 | High Bandwidth
- XDMCP Type: Indirect | Host: 10.10.2.46

Buttons: Submit, Reset

Collaboration Only

If using the collaboration only mode the session id must be input. As in the load balanced and XDMCP modes, the user name and password were verified against the LDAP entries and are already filled in. The user must enter the Session ID and the host name/address of the ThinAnywhere server where the originator session is running.

Powered By ThinAnywhere



The screenshot shows a web form titled "ThinAnywhere Log In" with the following fields and values:

- User ID: law
- Password: [masked]
- Server: 10.10.1.95 | 27500
- Session ID: 0 | High Bandwidth

Buttons: Submit, Reset

Administrator View

The Administrator can check the attributes of each load balance server through the web interface on the authentication server. The example page may be found in /opt/IIPServer/tawlb/examples/admin/index.php (http://server/taw/admin/). Information is provided for every enabled ThinAnywhere server in the network.



System List

(This page will automatically refresh in 15 seconds.)

Server Status	Server Address	Server Port	Number of CPUs	Number of Standard Sessions	Number of 3D Sessions	CPU Load Avg 1-minute	CPU Load Avg 5-minute	Free Memory (kiloBytes)	Paging Activity	Last Contact (sec)	Next Contact (sec)
A		27500	4	3	0	1	1	14880	1348	8	17
A		27500	1	3	0	1	1	842272	1600	15	5
A		27500	1	1	0	100	100	4588	160	1	24
I		27500	4	3	0	1	1	751696	620	223228	-223203

Server Address Color Coding:

Server addresses appearing in GREEN are ACTIVE.

Server addresses appearing in RED are INACTIVE.

[Go to thinanywhere.com](http://thinanywhere.com)

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Optional Load Balance Statistics Package

ThinAnywhere offers an optional Load Balance Statistics package to keep more detailed records of the machine usage and resources. Please refer to the separate documentation for that package for additional details.

ThinAnywhere Load Balancing Extension Quick Start Guide

Load Balancing Modules:

- ◆ **/opt/IIPServer/tawlb/tawlbextc** - "client" module to be run on each ThinAnywhere server
- ◆ **/opt/IIPServer/tawlb/tawlbexts** - "server" module that receives load information from each client module.
- ◆ **/opt/IIPServer/tawlb/tawlbgetsys** - module to retrieve information from load balancing server. This is designed to be called within a PHP web page or from a CGI script. (Examples are included.)
- ◆ **/opt/IIPServer/tawlb/examples** - directory containing example web pages and files. This may be symbolically linked to `/var/www/html/taw` for testing.

Configuring the Load Balancing server:

- ◆ Select the machine that will run as the "server". This is the machine that will collect the entirety of the load balancing information. A good choice would be the same machine hosting the web pages for log-in.
- ◆ Run the command `"/opt/IIPServer/tawlb/tawlbexts &"` This will start the server listening on the default ports 27508 & 27509.
- ◆ (This command can be placed in the file `"/opt/IIPServer/mit/S92iiplogin"` after the line `"export TAW_LICENSE_FILE".`)

Configuring the Load Balancing clients:

- ◆ On ALL ThinAnywhere server machines you wish to be in the load balancing group (including the machine selected as a load balancing server above), run the following command:

```
/opt/IIPServer/tawlb/tawlbextc -s SERVERNAME &
```

where SERVERNAME is the name or IP address of the load balancing server selected above. By default, it connects to the server on port 27508 and reports information every 60 seconds.

- ◆ NOTE: This command is included in script `"S92tawlbextc"` in the `/opt/IIPServer/tawlb*` directories and can be edited as desired.

Configuring the Load Balancing web page Login:

- ◆ Make sure that the Apache web server with PHP extensions is installed on the machine that will serve as the web server for the log-in page.
- ◆ Create a symbolic link:

```
ln -s /opt/IIPServer/tawlb/examples /var/www/html/taw
```
- ◆ IF the web pages will be on a different machine than the Load Balancing Server, edit the file `"/opt/IIPServer/tawlb/examples/index.php"` and change the value for `$server` from `"localhost"` to the IP address or name of the machine running the Load Balancing Server (`tawlbexts`).
- ◆ IF using LDAP, edit the file `"/opt/IIPServer/tawlb/examples/ldap_auth.php"` and make the same change as in `"index.php"`. Also modify the line for the `$ldapserver` to point to the IP address of the LDAP server to use.
- ◆ The web pages use the module `"/opt/IIPServer/tawlb/tawlbgetsys"` which connects to the server on the default port 27509.

To Test:

- ◆ Log on to a Windows machine that has the ThinAnywhere client properly installed.
- ◆ Start the web browser...

For standard logins (non-LDAP):

- ◆ Point to `"http://SERVERNAME/taw/"` where `SERVERNAME` is the name or IP address of the web server.
- ◆ It will ask for your user name and password. The load balancing software will automatically select the IP address.
- ◆ Press `"Submit"` and the browser will start the ThinAnywhere client with the log-in information provided.
- ◆ The values used to determine the load balancing ratings are configurable by the administrator in the web page (`index.php`)

For LDAP:

- ◆ Point to `"http://SERVERNAME/taw/index_ldap.php"` where `SERVERNAME` is the name or IP address of the web server.
- ◆ It will ask for your user name and password. You have to select the type of session.
- ◆ A second screen will appear with the appropriate fields to be filled out for the type of session selected.
- ◆ Press `"Submit"` and the browser will start the ThinAnywhere client with the log-in information provided.
- ◆ The values used to determine the load balancing ratings are configurable by the administrator in the web page (`ldap_auth.php`)

CHAPTER 9

Troubleshooting

<p>When I run tawadmin, I get this error :</p> <p>iipadmin: Error: IIPINI file not set or wrong server code</p> <p>iipadmin: Error: Connect status: 9</p>	<p>Edit the "iip.ini" file found in the "/opt/IIPServer/bin" directory and find the [RemoteControlHosts] section. Replace the words "ip_address..." with the proper IP addresses described.</p> <p>NOTE: If there is a blank after the "ALLOW" keyword, the DNS may not have been set up correctly during installation. Add the IP address of the machine.</p> <pre>[RemoteControlHosts] ALLOW 127.0.0.1 ALLOW ip_address_of_this_thinanywhere_server ALLOW ip_address_of_admin_tool_web_server</pre>
<p>I really want to track who logs in on the ThinAnywhere server, when and for how long. How can this be accomplished?</p>	<p>Here's how to turn on logging:</p> <pre>cd /opt/IIPServer/bin</pre> <p>Edit the "iip.ini" file, under the [iIPLogin] section, set the following: PrintDebug 62</p> <p>This will log each time a user logs on or logs off. The log file will be identified by the "LogFile" line. It is usually at "/opt/IIPServer/logs/iiplogin.log". You can print this file to get the information you need.</p>
<p>Is there a guide to Video card requirements for the ThinAnywhere 3D hardware accelerated server?</p>	<p>To find out if your card will work for the ThinAnywhere 3D hardware accelerated server, see the information.</p> <p>Common Buses and their Max Bandwidth:</p> <pre>PCI Express 1x 250 MB/s PCI Express 2x 500 MB/s PCI Express 4x 1000 MB/s PCI Express 8x 2000 MB/s PCI Express 16x 4000 MB/s PCI Express 32x 8000 MB/s</pre> <p>Anything in the above list that is in green is acceptable. The red is unacceptable. So, a PCI 8x, 16x, 32x will work. The card must support 3D OpenGL and hardware acceleration.</p>

<p>I have some disconnected sessions that I would like to kill, how can I do that?</p>	<p>You can kill any session using the "tawadmin" program. To access the "tawadmin" program on the ThinAnywhere server, login as "root". If you are on a desktop on the server, open a terminal and do the following,</p> <p>Execute: /opt/IIPServer/bin/tawadmin This will open the "tawadmin program.</p> <p>The ThinAnywhere Login Statistics window will look similar to this:</p> <pre>----- ThinAnywhere Login Statistics ----- Sys8 Release X.XX Commands: h = Help Screen, t = Toggle Screen, s = Seconds to update, d = Disconnect, k = Kill Session, q = Quit User Login - Time S Disp S-ID Type ShmID dan3 10/22 11:03:28 C :30 1885 O 52920331 ... dan3 10/22 14:29:09 C :31 1885 C 94351084 ... bob2 10/24 10:25:13 D :32 1425 O 26375237 ...</pre> <p>Available licenses: 12</p> <p>The table heading "S" indicates whether a session is Connected "C" or Disconnected "D". The table heading "S-ID" indicates the Session ID Number. The table heading "Type" indicates whether the user is the session Originator "O" or is a Collaborator "C".</p> <p>To kill a session, enter "k+S-ID" and hit "Enter". Example: To kill the disconnected session of user bob2, Execute: k1425 and hit "Enter".</p> <p>To exit the "tawadmin" program, enter "q".</p>
<p>What if the disconnected session is still hung after trying the "k" option in tawadmin?</p>	<p>As "root" user, run the "tawadmin" executable and find the "ShmID" value for the session that is hung.</p> <p>Run (also as root) the command "ipcs -a grep {shmID}" where {shmID} is the shared memory segment ID for that hung session.</p> <p>If it exists, check the number on the far right. It should be zero. If so, remove the hung session with the following command:</p> <pre>ipcrm -m {shmID}</pre>

<p>How do I set up support for keyboards other than US English?</p>	<p>The “xmodmap” utility must be installed on the ThinAnywhere server. We have supplied several “modmap” files designed to work with ThinAnywhere in /opt/IIPServer/lib/keymaps.</p> <p>The default iipstartup file contains an example of installing the modmap file. Uncomment from the sample, or add the line:</p> <p style="padding-left: 40px;">xmodmap /opt/IIPServer/lib/keymaps/iipmodmap.?? (?? = the file name ending for the keyboard you wish to be supported)</p> <p>to the system “iipstartupglobal.sh” file or each user's "\$HOME/.iipstartup" file.</p> <p>Modmaps supported are:</p> <p style="padding-left: 40px;">iipmodmap.en-us (US English) iipmodmap.uk (UK English) iipmodmap.fr (French) iipmodmap.it (Italian) iipmodmap.la (Spanish – Latin American) iipmodmap.no (Norwegian)</p>
<p>My Load Balance server is not allowed to run the load balancing modules because of SELINUX settings. How can I remedy this?</p>	<p>The “enforcing” level of the "SELinux" security package is the default on many versions of RHEL/CentOS Linux. This extra security level prevents the web server from executing the Load Balance modules necessary for proper execution.</p> <p>To change the security level for next boot, do the following.</p> <p style="padding-left: 40px;">Edit "/etc/selinux/config"</p> <p style="padding-left: 40px;">Find the line:</p> <p style="padding-left: 80px;">SELINUX=enforcing</p> <p style="padding-left: 40px;">Change it to:</p> <p style="padding-left: 80px;">SELINUX=permissive</p> <p style="padding-left: 40px;">Then reboot.</p> <p>To change the security level while the machine is running:</p> <p style="padding-left: 40px;">setenforce 0 getenforce</p>

CHAPTER 10

Product Support

Reporting Procedures

ThinAnywhere® contains some enhancements suggested by customers. We encourage users of ThinAnywhere® to suggest further improvements for future releases.

For us to take effective action on any request we must have complete information. For new features, or enhancements to existing features, we need a description complete enough to fully define the request.

For incident or bug reports we need:

- Your name and company name and address, telephone number, email address and any other information that will allow us to contact you.
- The operating system and revision used for the ThinAnywhere® Client and the application server. For example: TAW Client: Windows 10, App Server: RHEL 7.7 (RHEL/CentOS version stored in /etc/redhat-release).
- The version of ThinAnywhere® Client you are running.
- If it was related to a specific application: The name, manufacturer and release number of the application that gave the error.
- Copies of the error log or screen messages that were generated during the error. (ThinAnywhere Linux® logs are located in /opt/IIPServer/logs)
- List of packages installed on the server: `rpm -q -a`
- A complete description of the error.
- An explanation of the expected results.

Contacting ThinAnywhere

If additional help is needed please contact one of our customer support representatives at:

Email: support@thinanywhere.com

Web Site: <http://www.thinanywhere.com>

Phone: 918-583-1182

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XFree86

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Mesa 3-D graphics library Version: 3.3

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This software includes an implementation of the AES encryption algorithm (Rijndael) designed by Joan Daemen and Vincent Rijmen.

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