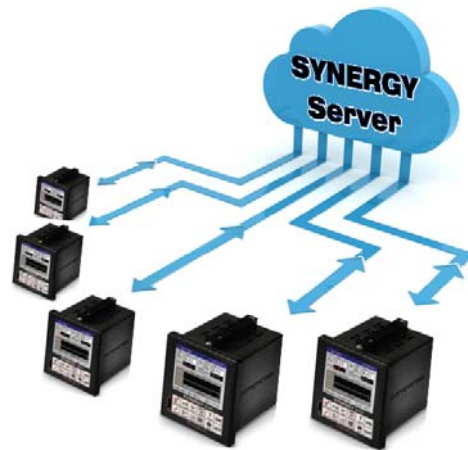## Synergy Server Appliance Application

Tidal Engineering's Synergy Controllers, the Synergy Micro 2, Synergy Quattro, and the ¼ DIN Synergy Nano provide state-of-the-art usability and connectivity for environmental test control and data acquisition and combine the functions of a chamber controller and a data logger.   These controllers are designed to improve test efficiency by supporting both factory automation and test and measurement protocols and standards.

The **Synergy Server** is a web server appliance designed to provide virtually unlimited centralized and searchable storage for any number of Synergy Controllers. Based on open source LAMP server technology (Linux, Apache Web Server, MySQL Database, and PHP scripting platform) and server virtualization, the **Synergy Server** provides a simple Web Interface for:

- Centralized Recipe Storage
- Centralized Test Results Storage
- Centralized Controller Backup Storage

The software appliance can be installed on any Windows PC or Server in the enterprise running VMware Player or VMware ESXi. **Synergy Server** functionality is available on Synergy Controller software versions 3.0.14 and later. Section 2 of this application note provides the installation instructions for the Synergy Server and procedures for supporting multiple Synergy Controllers with Synergy Server.

Table of Contents

1 Synergy Server Operation

1.1 Synergy Menu Overview

To connect to the **SYNERGY Server** from your desktop or mobile browser, type the IP address of your **SYNERGY Server** in your web browser as follows: 172.16.10.200/SynServer/.

The Synergy Server Main Menu provides the following choices:

- Dashboard – Displays recent activity (as shown below)
- Users – Lists current users and supports user add, delete, and edit functions.
- Controllers– Lists current controllers and supports controller add, delete, and edit functions.
- Test Profiles– Lists current profiles and supports profiles add and delete.
- Controller Backup - Lists Controller Settings Backup files and supports add and delete.
- Test Results- Lists test results files and supports add and delete.
- Maintenance –Detailed Synergy Server status and provides upgrade and maintenance features.
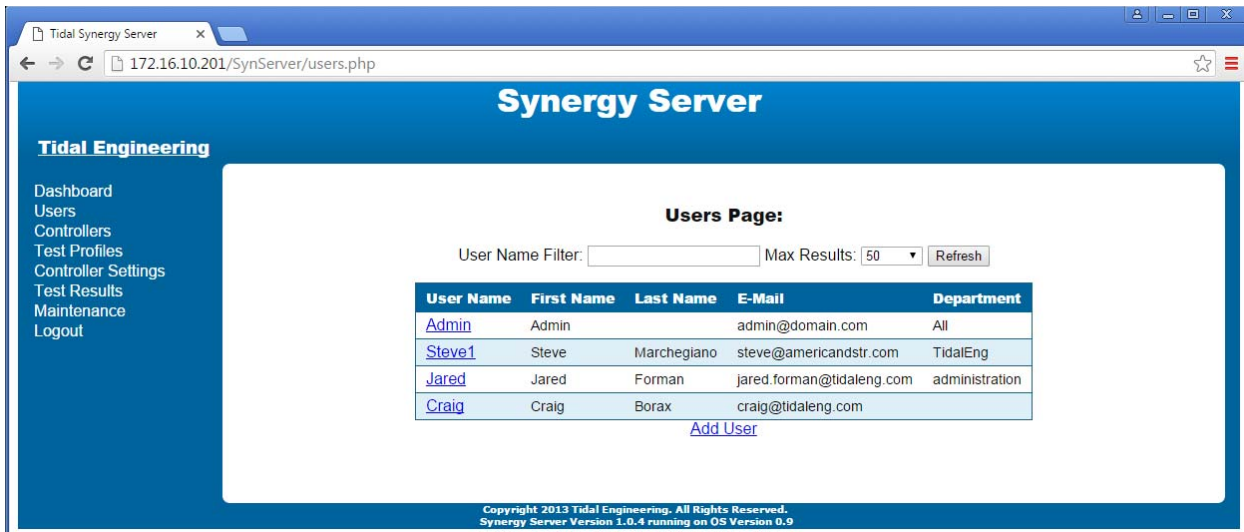- Logout – Closes Synergy Server session.

1.2 Synergy Server Dashboard Page

1.3   Synergy Server Users Page

Synergy Server provides password protected access control for multiple users. Each user is setup from the User Page by pressing the **Add User** link at the bottom of the page.

Enter the user information and permissions and then press the **Add User** button to create the new user.
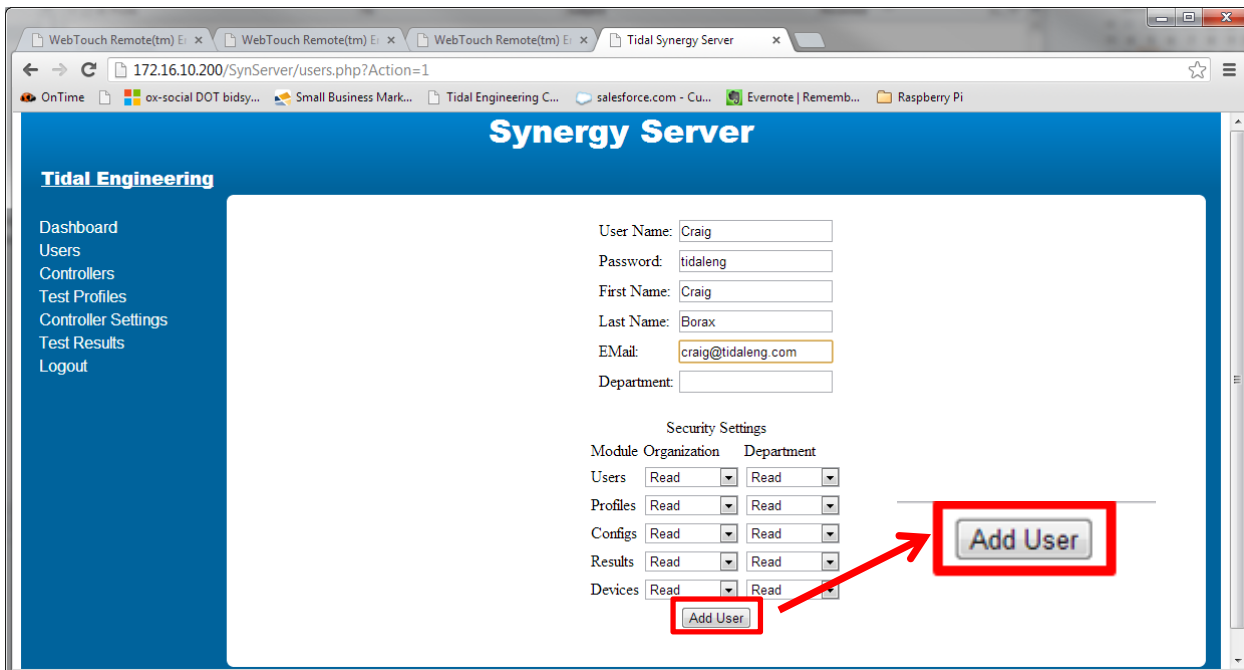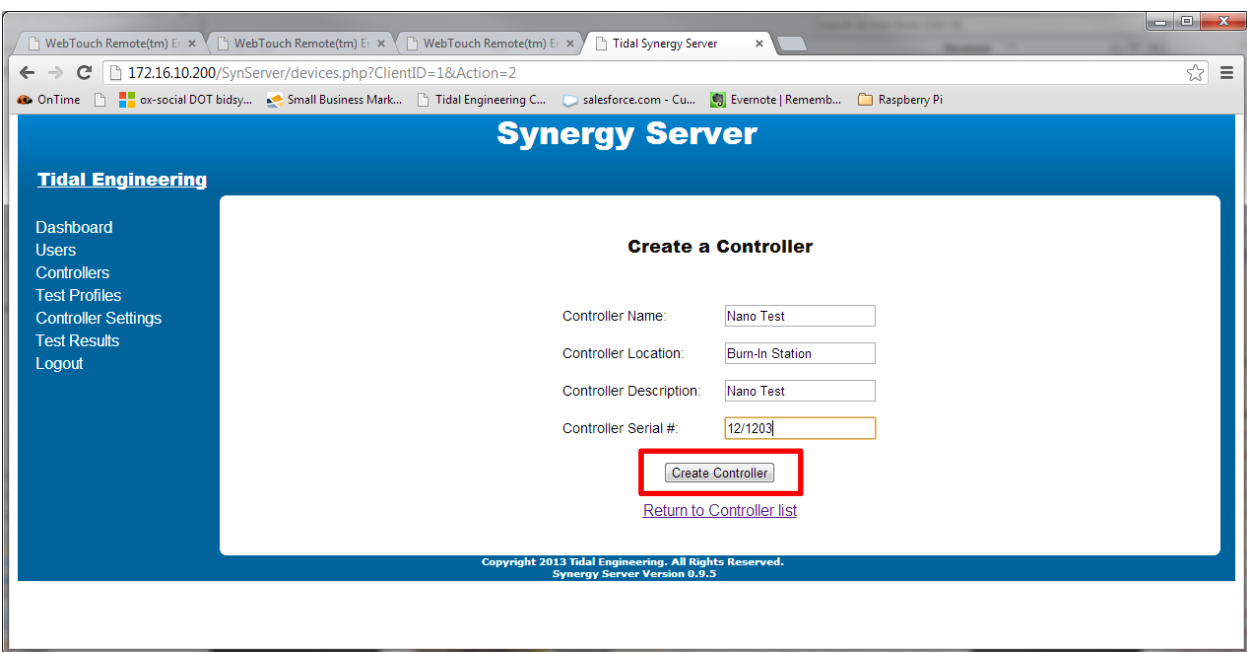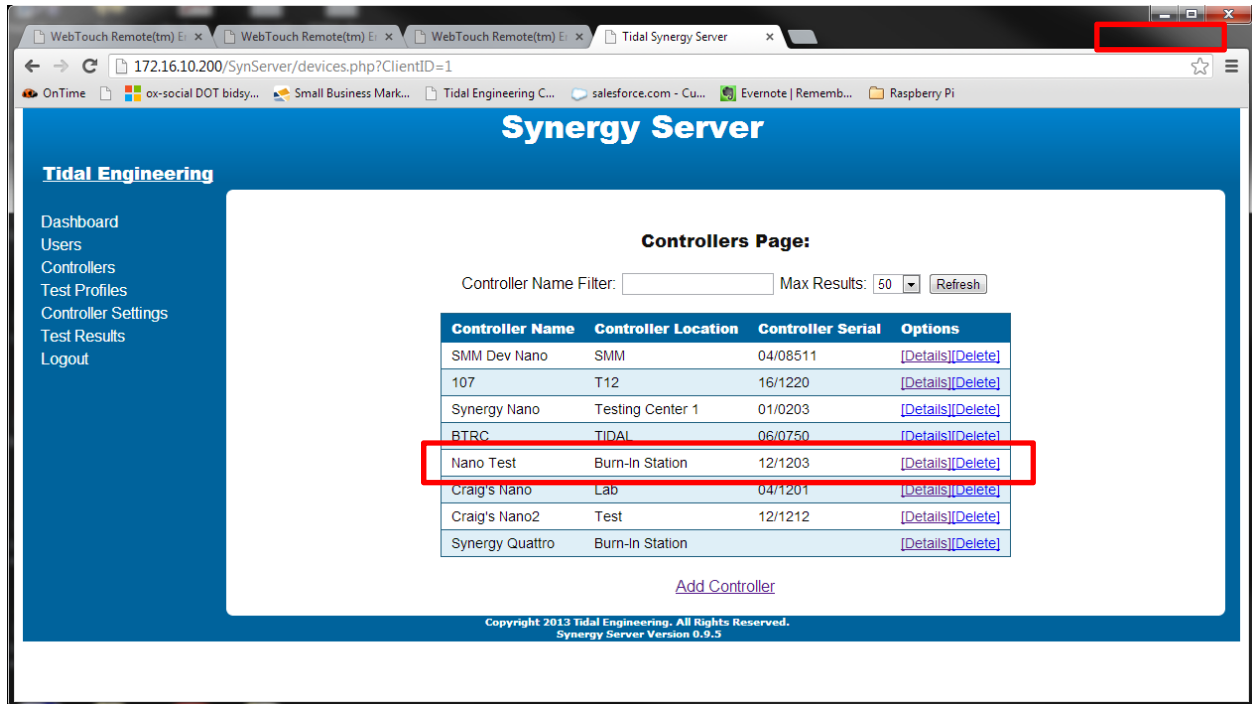
1.4   Synergy Server Controllers Page

To open the Synergy Server **Controllers Page** click on the **Controllers** selection in the **Main Menu**. The Synergy Server Controllers page shows a list of the controllers that are registered with the Synergy Server. To add a controller, press the **Add Controller** button at the bottom of the page:
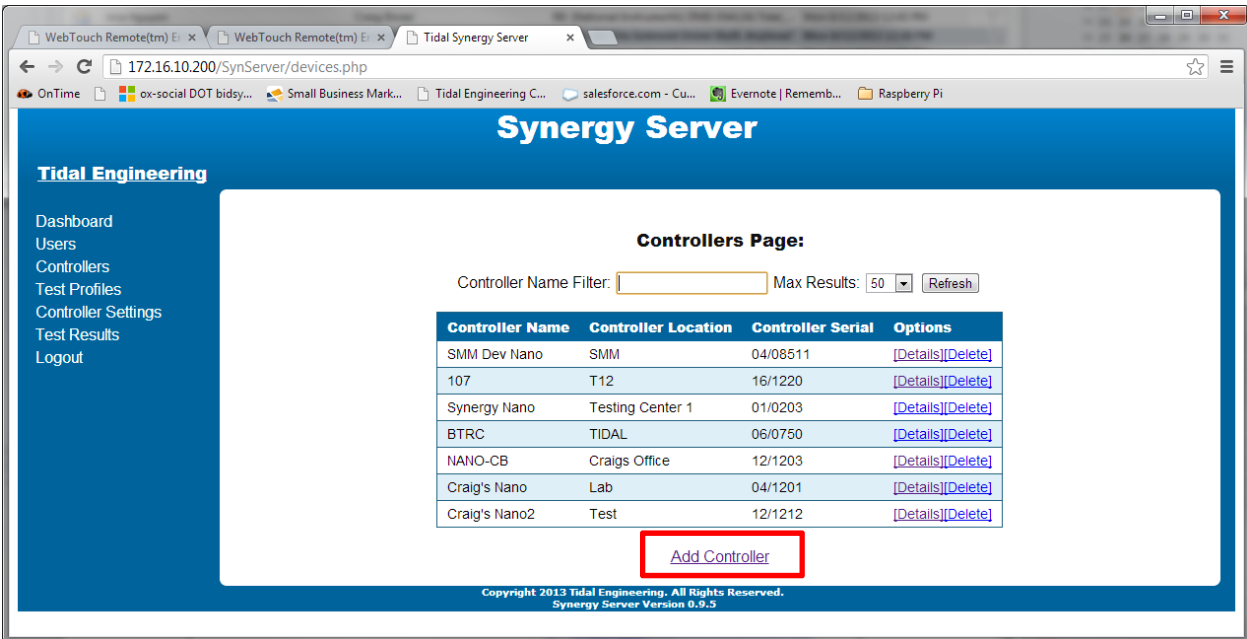
Enter the controller information as shown below then press **Create Controller** button:

Look for the new controller on the **Controllers Page**.

Once the controller is setup on the Synergy Server, go to the Synergy Controller and browse to the **Synergy Server** folder to configure your controller to work with the **SYNERGY Server**.

Browse to the **Ethernet Network** folder on the Communication Screen as shown below and 1) press the **Synergy Server** folder. 2) Then press the **Synergy Server Setup** folder:
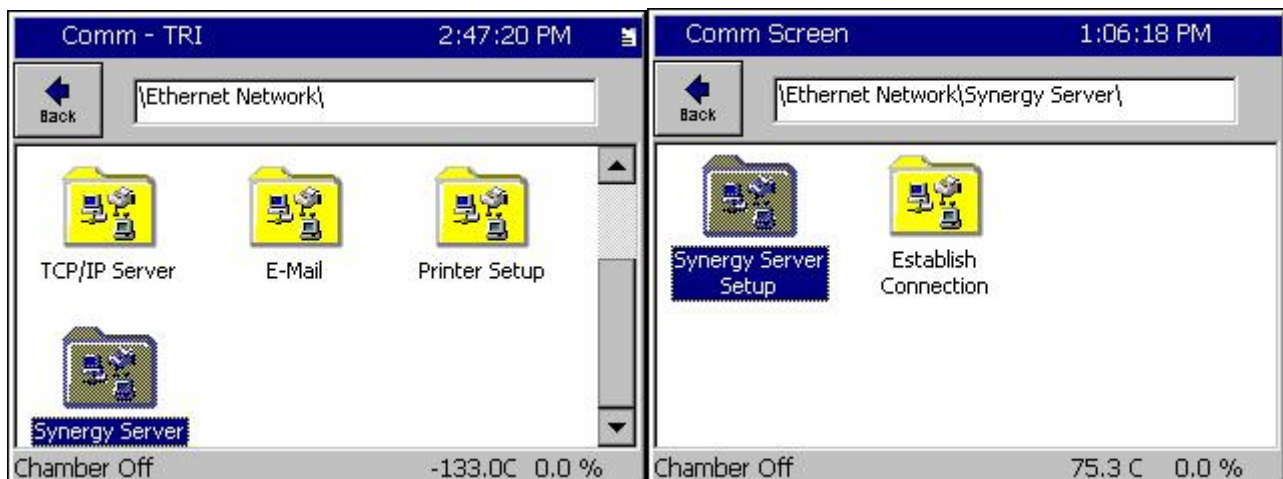
Press the text box to open the Alpha-Numeric Pad and enter the **Synergy Server Registration Key** as shown below, then press **Register**. Contact Tidal Engineering for your **Synergy Server Registration Key**.
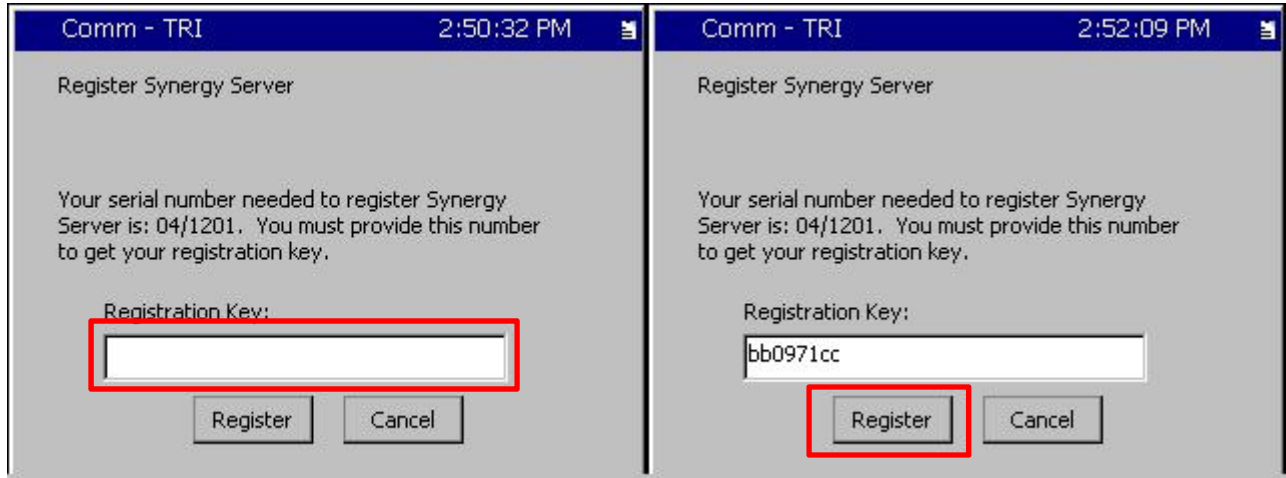

The Synergy Controller will open a dialog window to indicate whether the Synergy Server Key was registered successfully or not as shown below.


If it was registered successfully, press OK to close the dialog and the Synergy Server Setup folder will open. If the key was not registered successfully, check to make sure that the key was entered correctly.
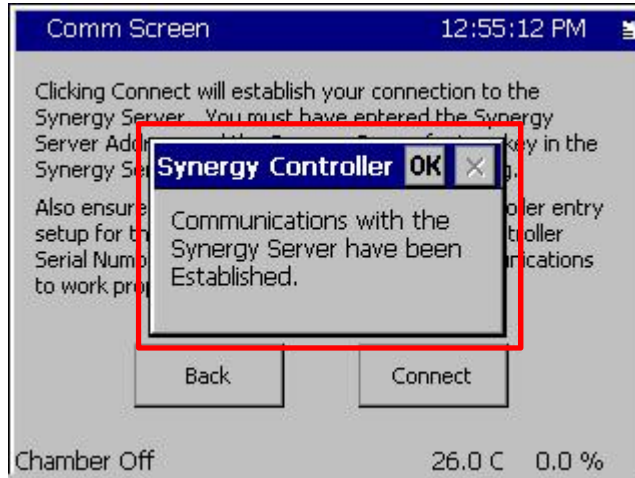
To connect to the **Synergy Server**, set the **Synergy Server On/Off** parameter to **Enabled** and then enter the Synergy Server IP address as shown below.
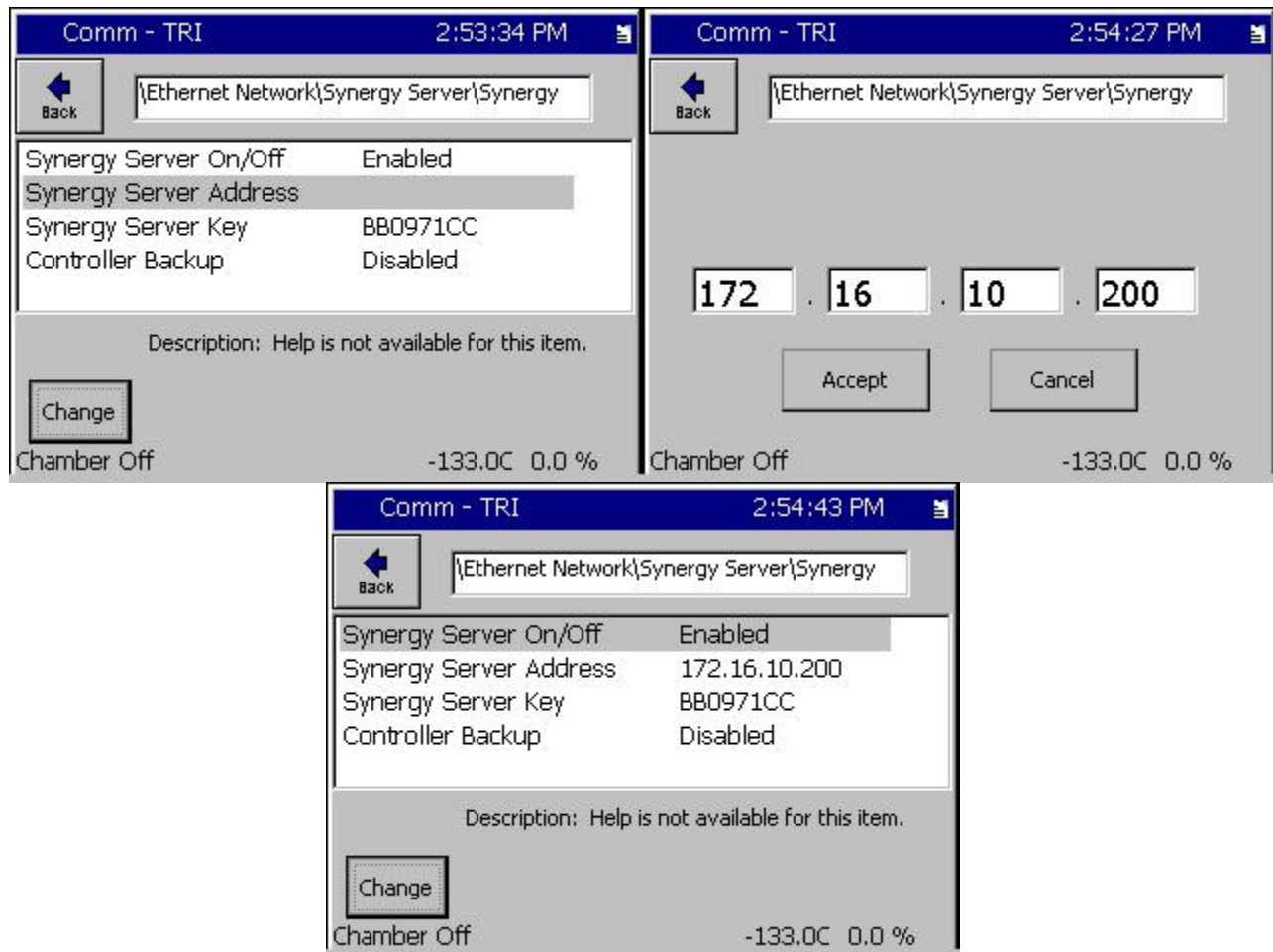

Press the Back button and get back to the Synergy Server folder and press the Synergy Server **Establish Connection** folder. Press **Connect** to establish the connection to the Synergy Server.
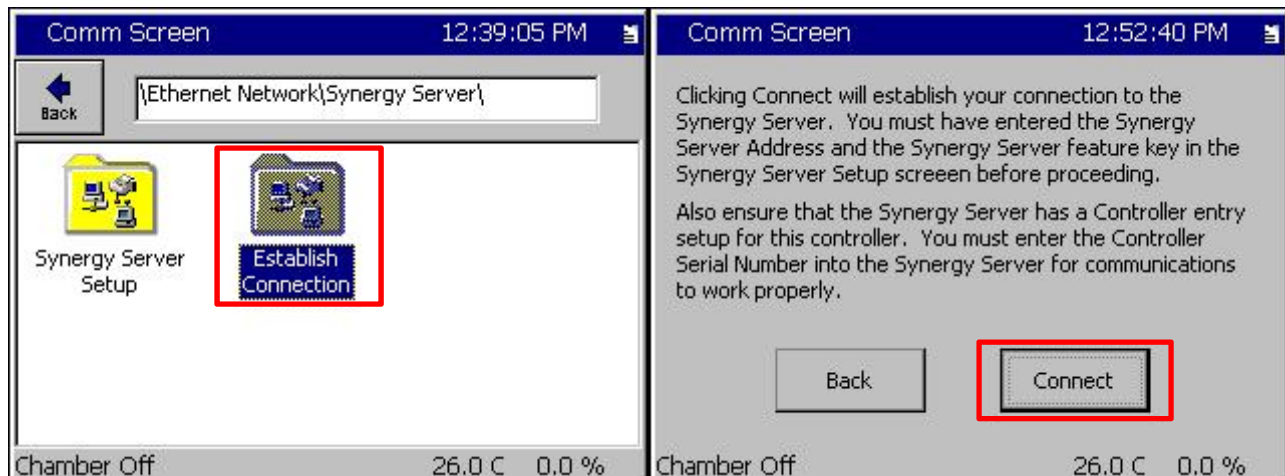
The controller will provide feedback when "Communications with the Synergy Server have been established" as shown below.

Otherwise, if the Synergy controller fails to connect to the Synergy Server then the dialog will provide information about the problem as shown below:
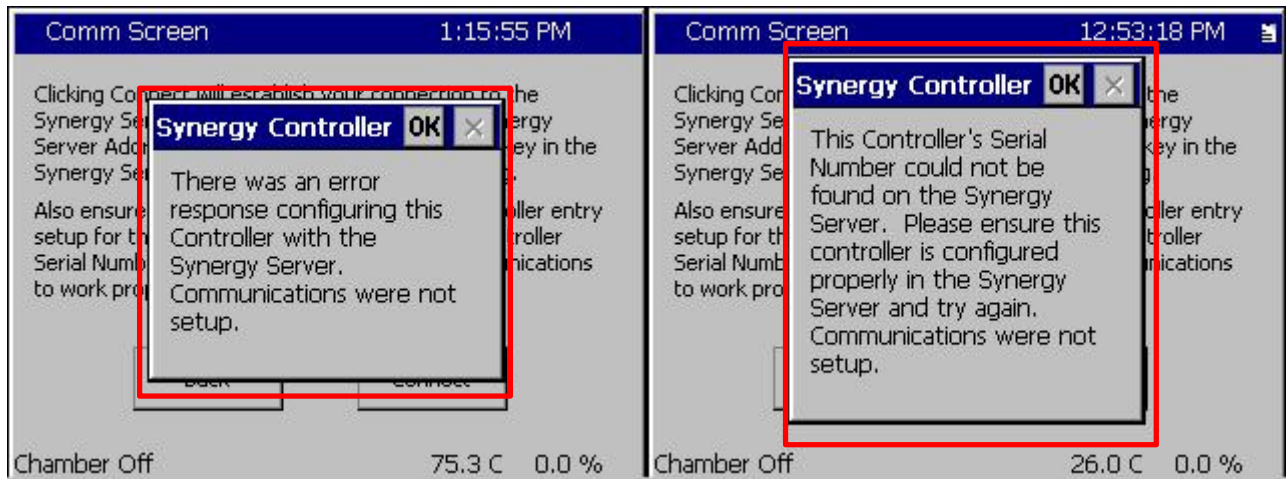
1.5 Synergy Server Test Profile Page

To open the Synergy Server **Test Profiles Page** click on the **Test Profiles** selection in the **Main Menu**. The Synergy Server Test Profiles page shows a list of the profiles (programs) that are stored on the Synergy Server.

One of the benefits of the Synergy Server is its virtually unlimited storage capability. The filter/search capability makes it easy to manage them. At the top of the Test Profiles Page the **Profile Name Filter** is used to select specific test profiles on the server. For example, type MIL-STD in the filter to select all of the tests whose test name contains "MIL-STD ".

Profiles can be sent from the controller to the **Test Profiles Page** or from the PC to the page. You can create test profiles on your PC using Synergy Manager Software which is available as a free download from our website. http://www.tidaleng.com/synergyman.htm

To upload a Test Profile press from a PC, press the **Add a Profile** link at the bottom of the page:

Press the **Choose File** button as shown below
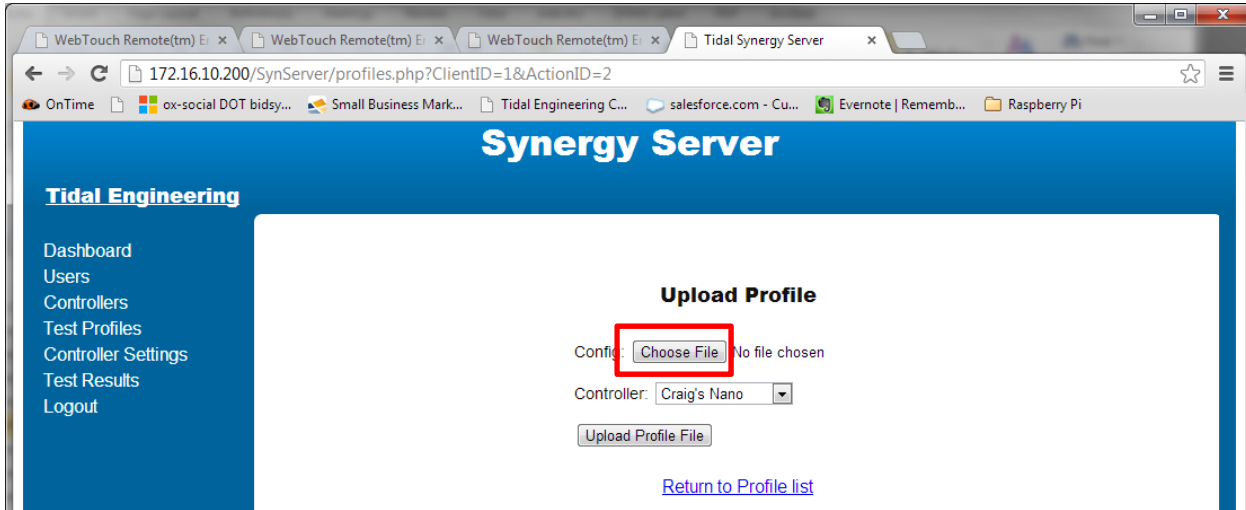
Browse to the profile on your PC and press the **Open** button as shown below.
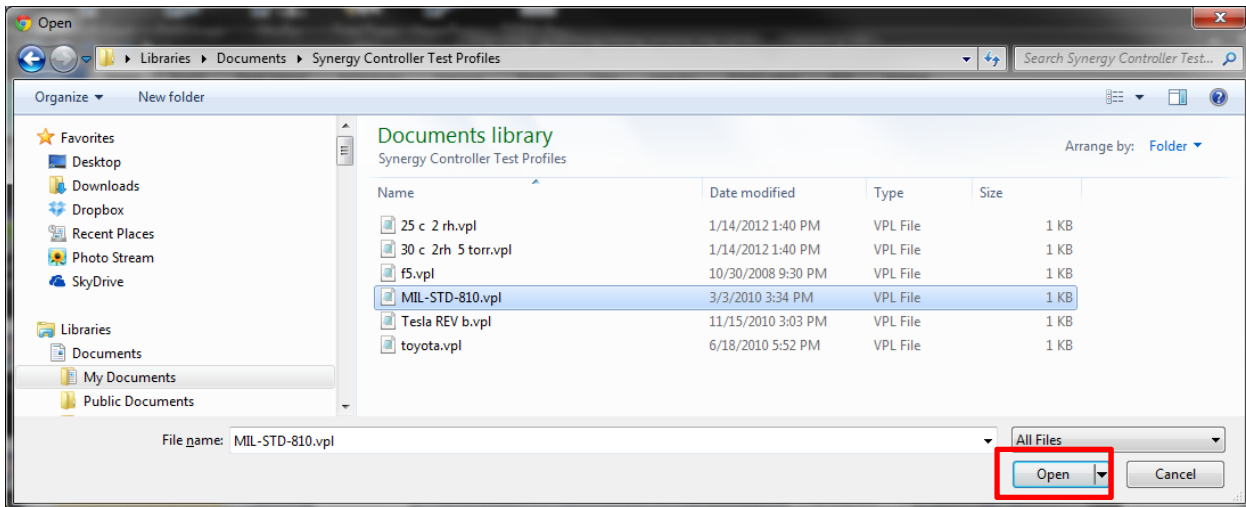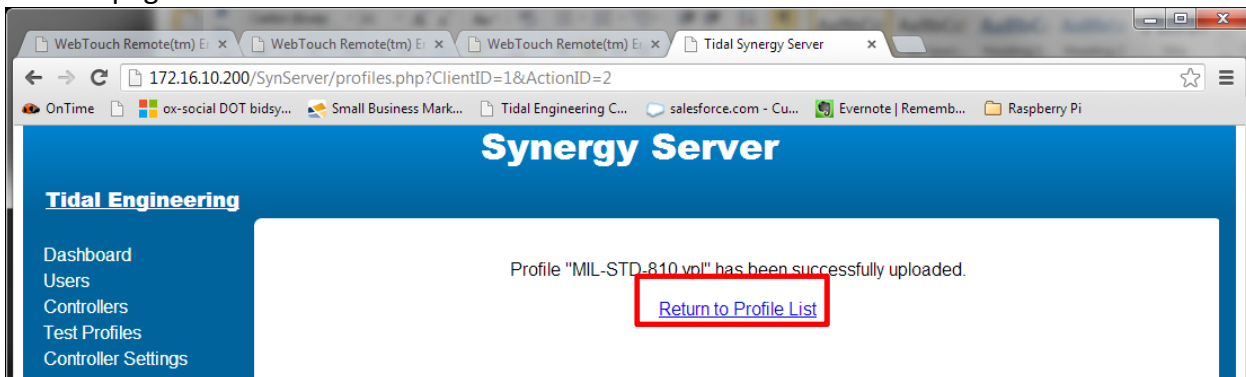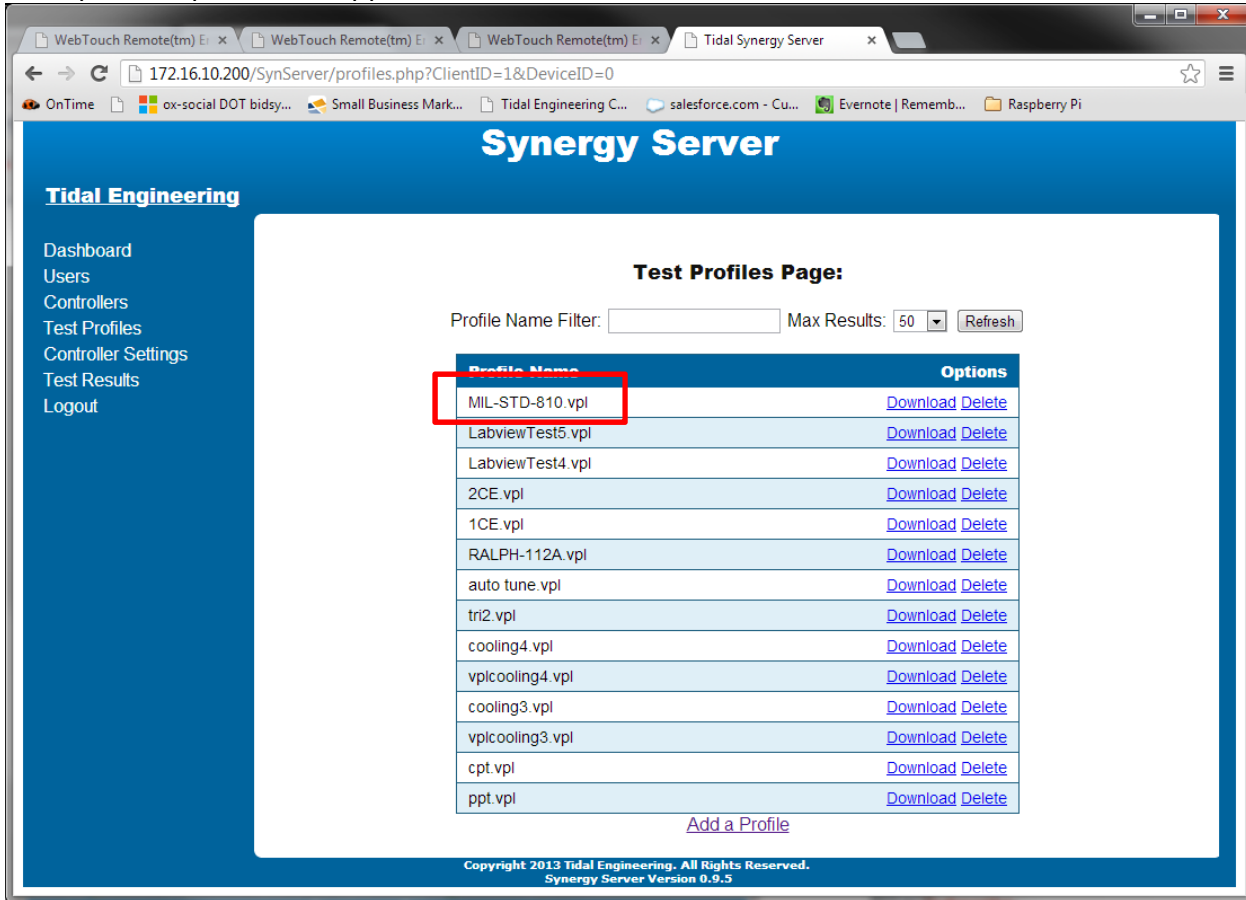
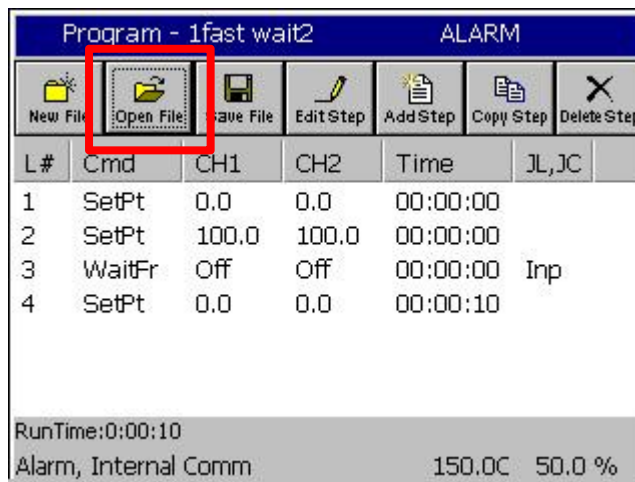Then press the **Upload Profile File** button.

The page will indicate that the profile has been successfully uploaded. Click **Return to Profile List** to exit the page.
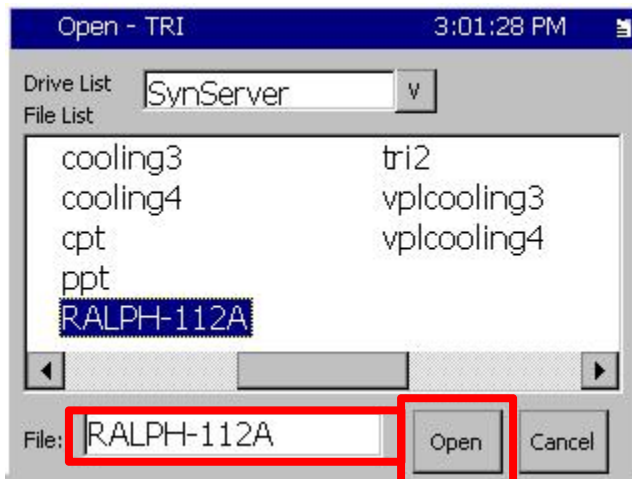
The uploaded profile will appear in the Profile list.

To open a profile on the Synergy Controller from the **SynergyServer**, open the **Program** or **Run** Screen and press the **Open File** button.

Drop down the **Drive List** and select **SynServer**, then select the Profile in the list and press **Open**.
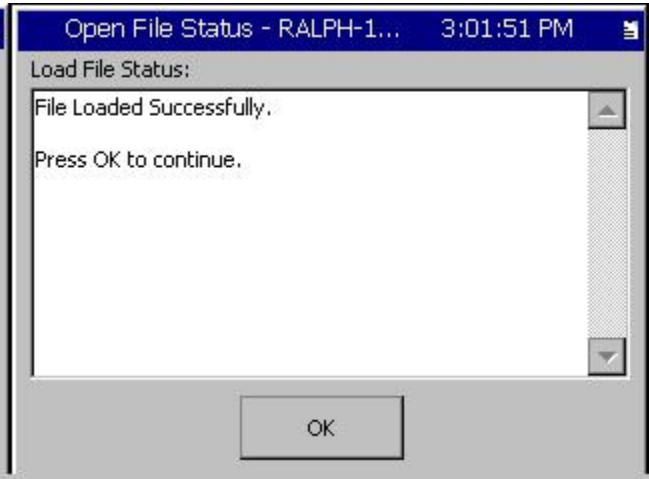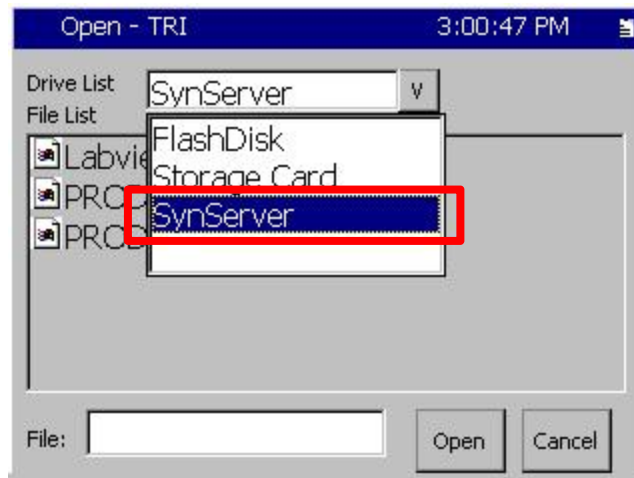
To save a profile to the **Synergy Server**, open the **Program** or **Run** Screen and press the **Save File** button. Then select **SynServer** from the drive list and press **Save**.
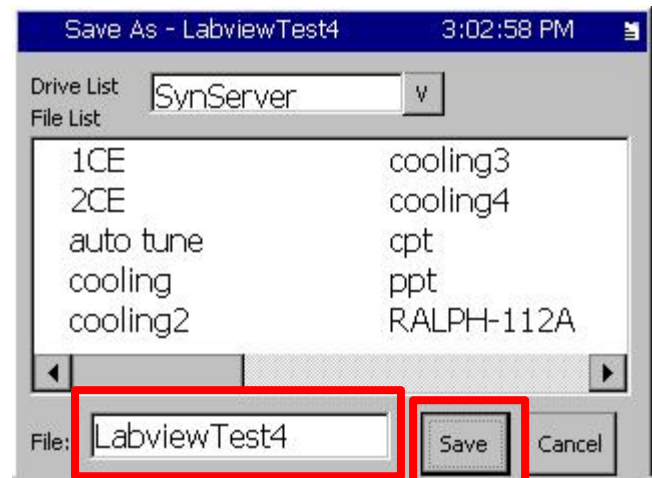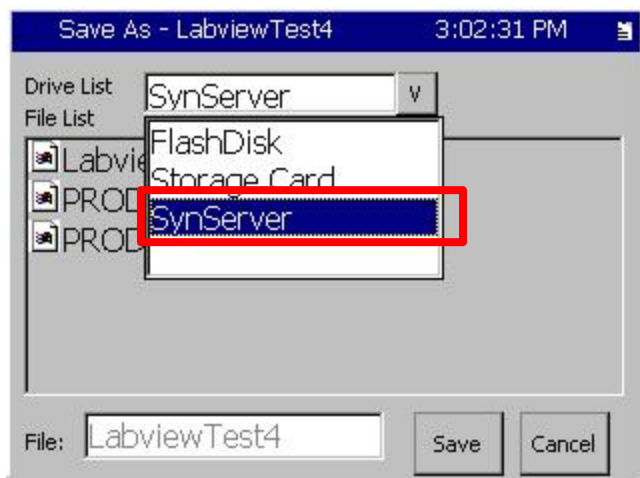
Look for the new profile on the Synergy Server **Test Profiles Page**.
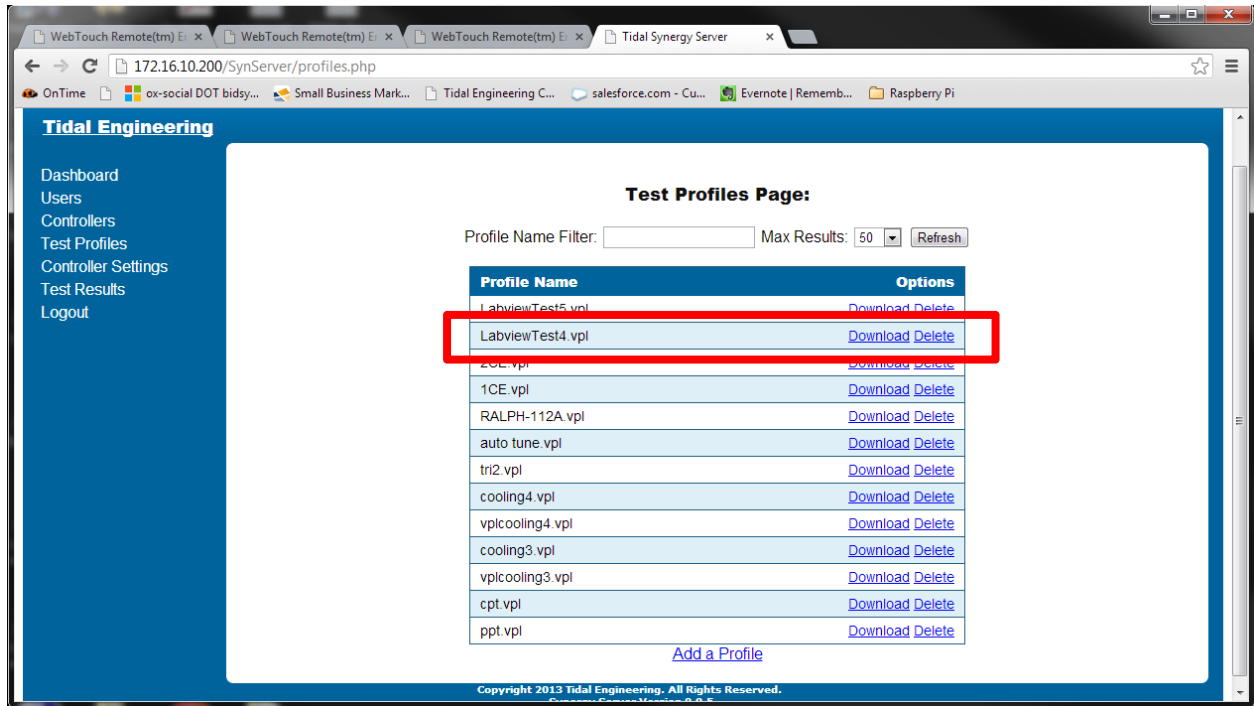

1.6   Synergy Controller Backup and Restore

The Synergy Server provides storage for controller backups.

To backup your controller's settings, press the **Backup Settings** Folder in the Maintenance Screen as shown below and then press the **Browse** button**.**
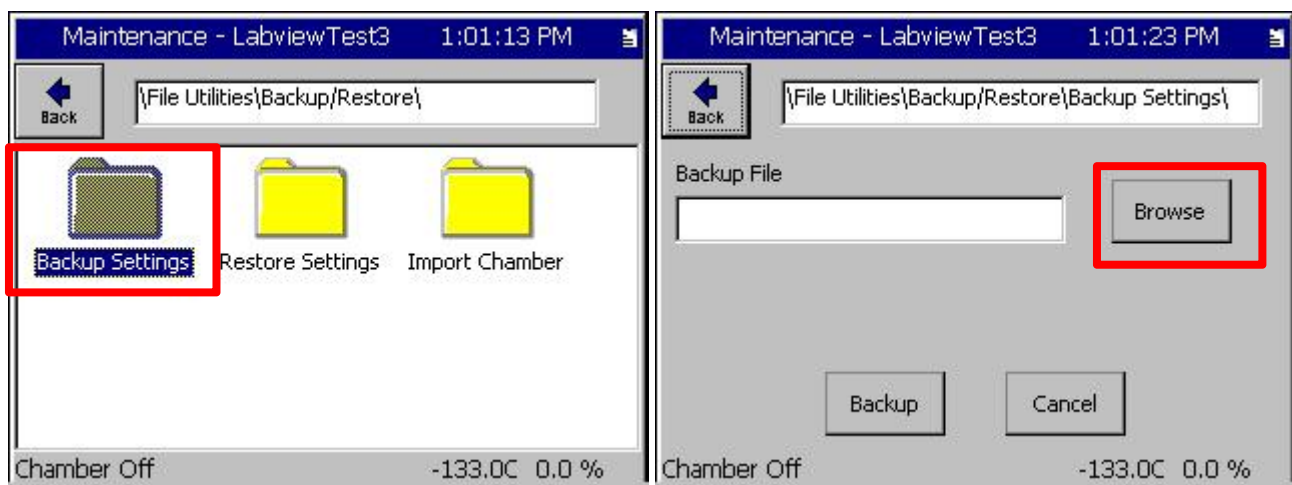
Dropdown the **Drive List** and select **SynServer**. Then press the **File** text box at the bottom of the window to open the **T9 Pad**.
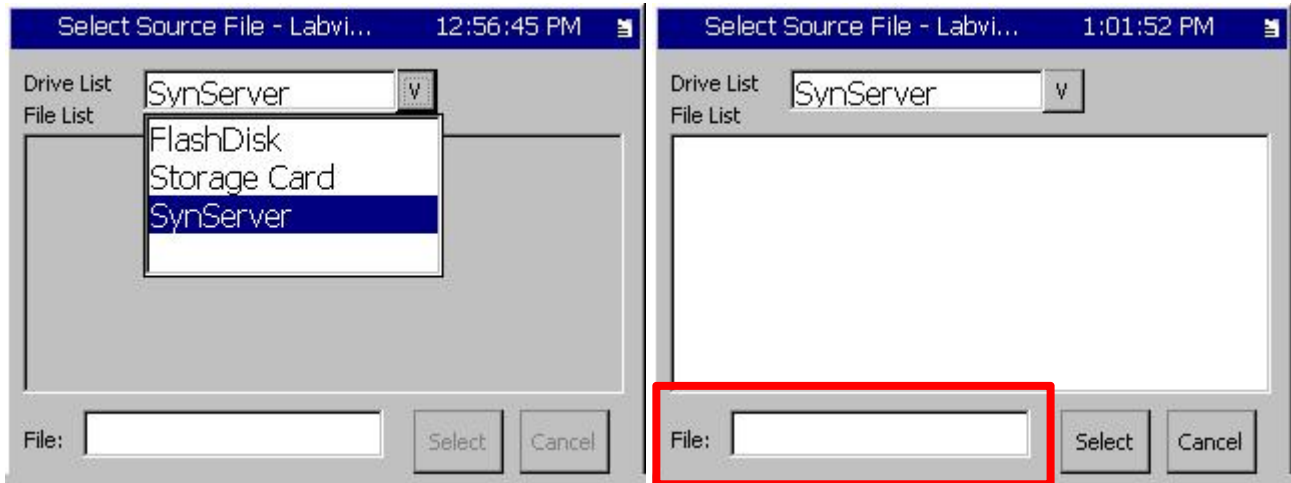
Enter the file name with the **T9 Pad** and Press **OK**. Then press **Select**.
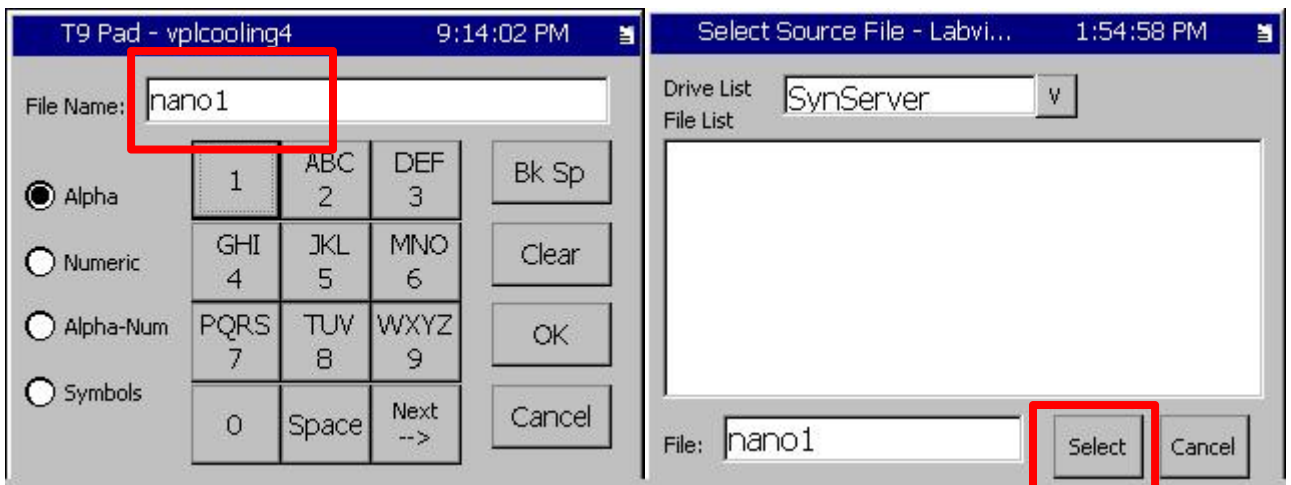
Check the Backup File entry and press the **Backup** button to send the settings to the Synergy Server.
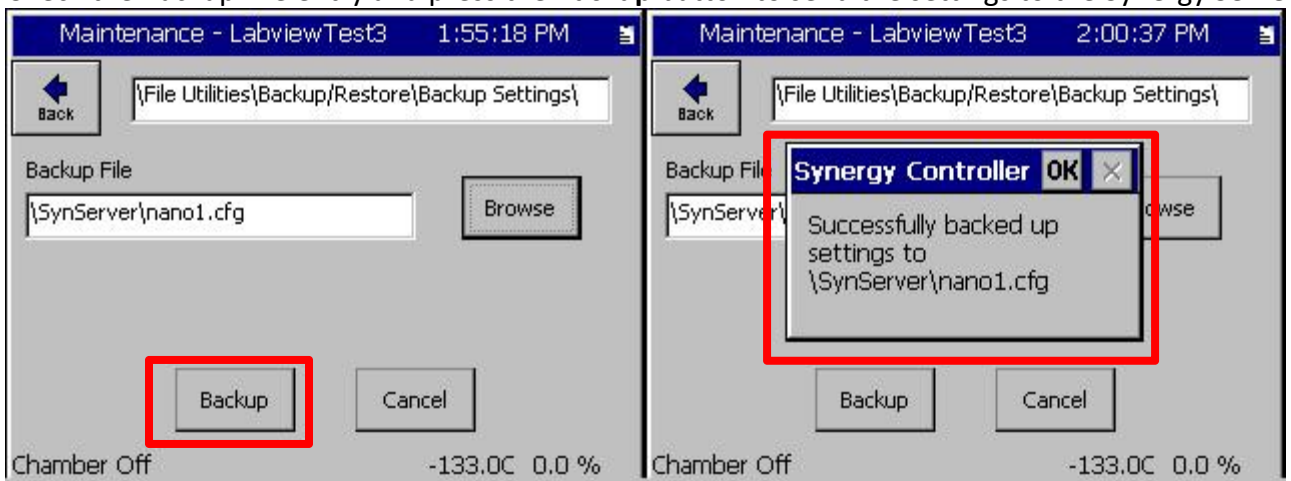
Look for the new entry on the Controller **Settings** page as shown below
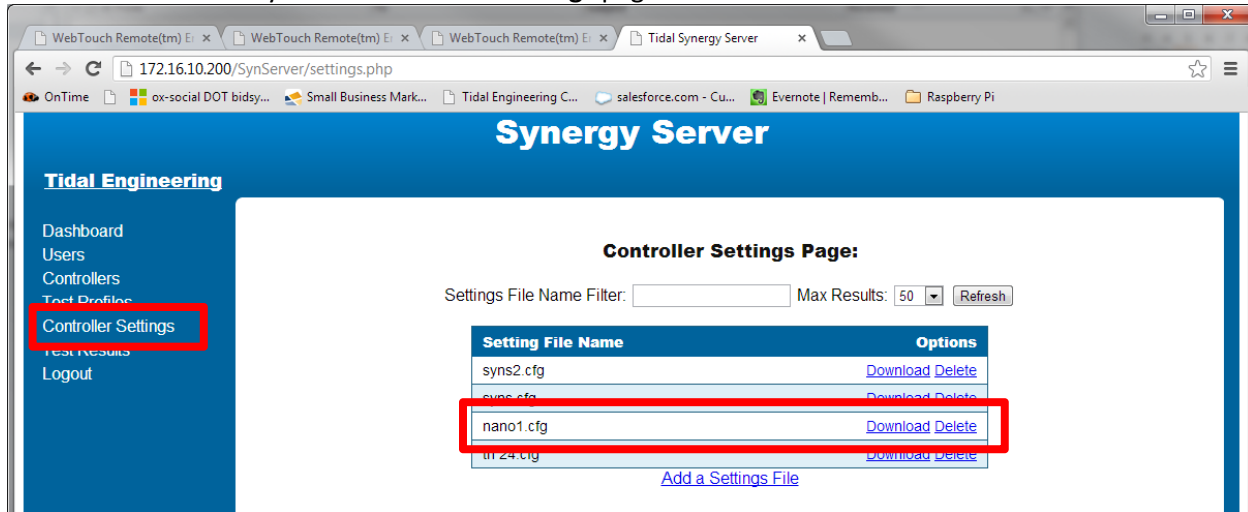
Press the Download link to open the settings file.

To restore a controller's settings from the Synergy Server, press the **Restore Settings** folder in the Maintenance Screen as shown below and then press the **Browse** button.

Drop down **SynServer** in the **Drive List** and select the settings file for download then press **Select** and **Restore**.

1.7   Synergy Server Test Results Page

As mentioned above, one of the benefits of the Synergy Server is its virtually unlimited capacity to store test results. This feature combined with Synergy Server's search capa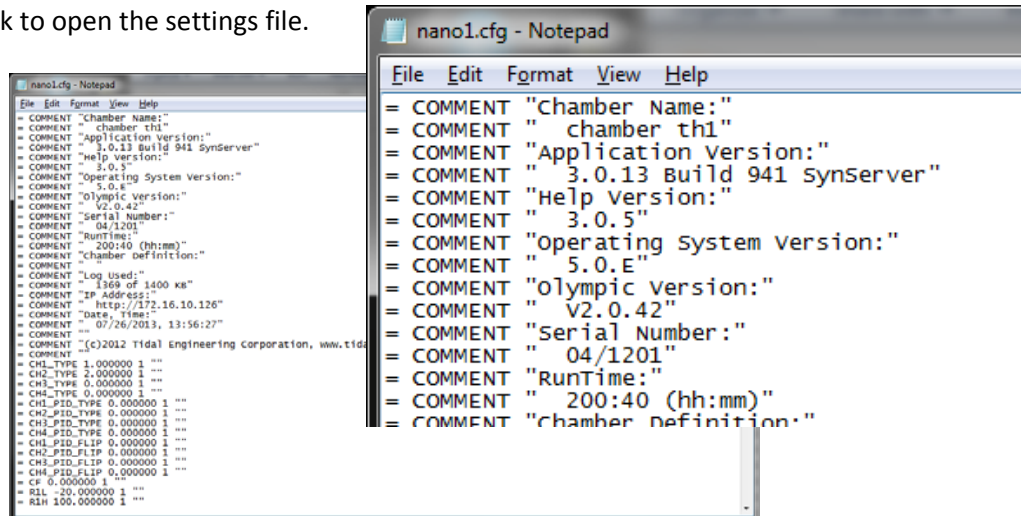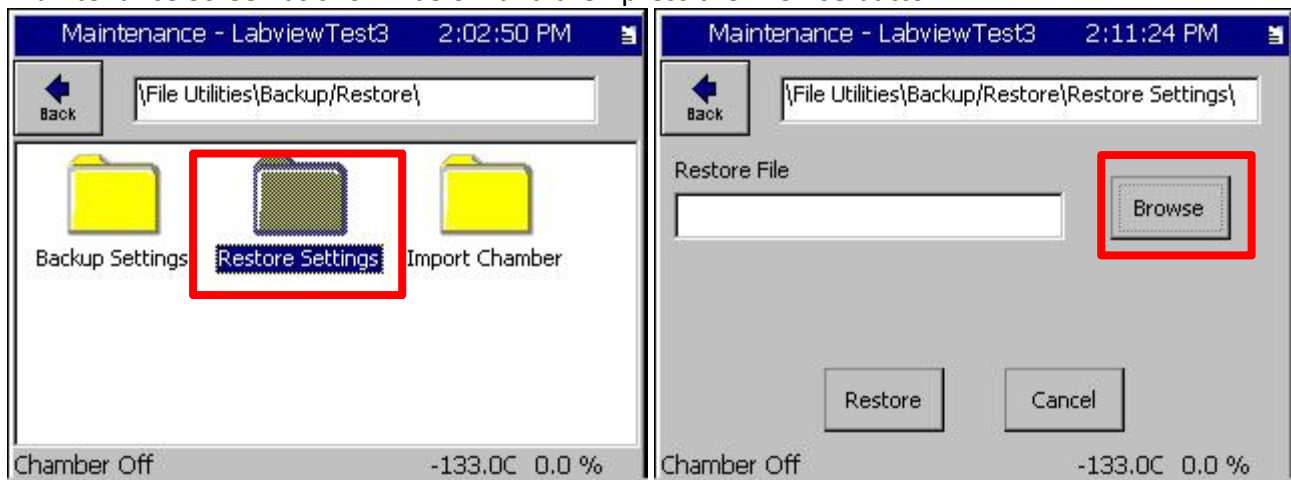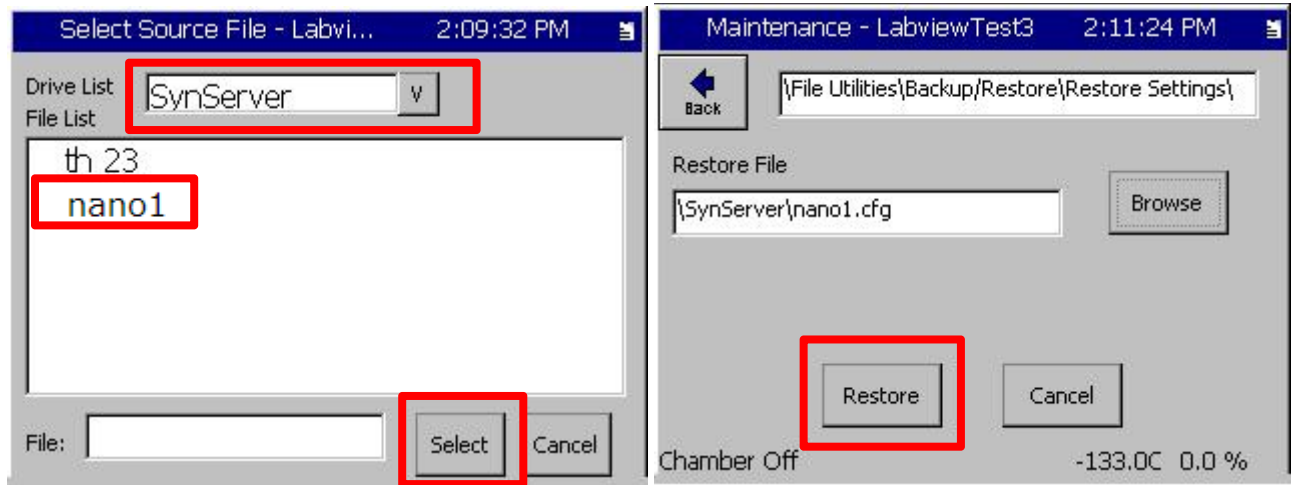bilities make it easy to manage a large database of test results. The **Test Name Filter** at the top of the **Test Results Page** is used to select specific test records on the server.   For example, type BTRC in the Test Name Filter box at the top of the page to select all of the tests whose controller name or test name contains "BTRC" as shown below.
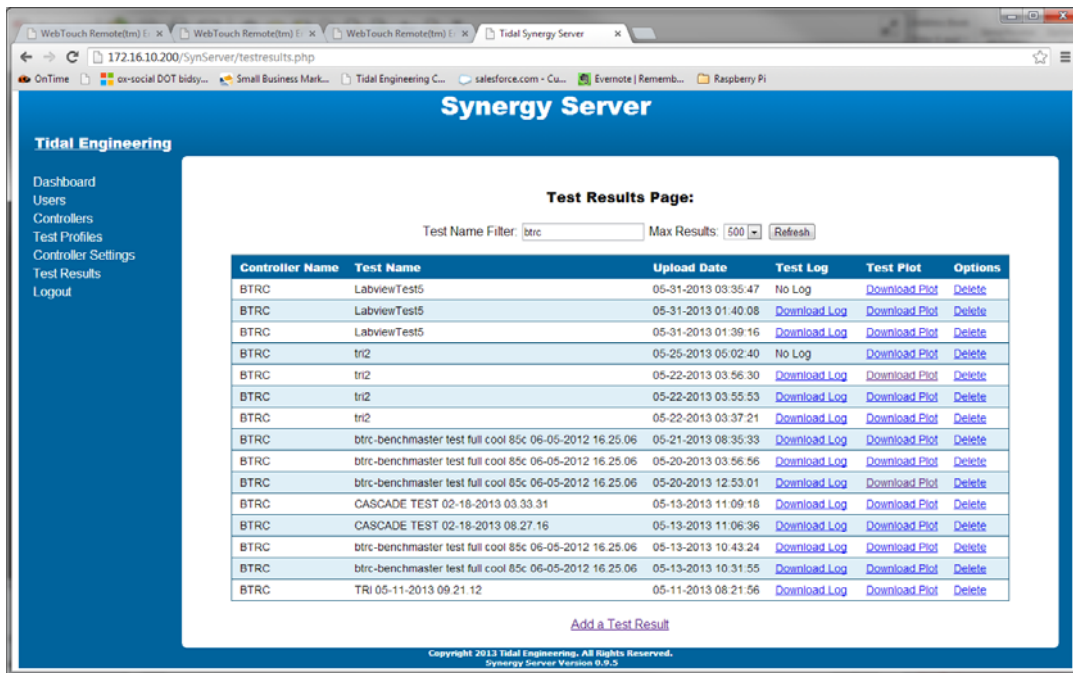
The Synergy Server's capacity to store test results combined with the Synergy Controller's ability to automatically **Deliver Test Results** is a very useful combination.

To setup your controller to use these capabilities, enable the **Log Each Profile** feature and choose the file naming format in the Logging Folder as shown below.
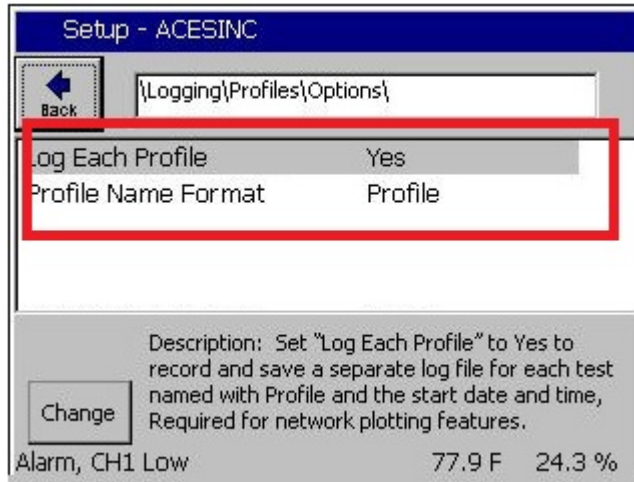
Then choose from the delivery options in the **Setup\Logging\Profiles\Deliver Test Results** folder as shown below:
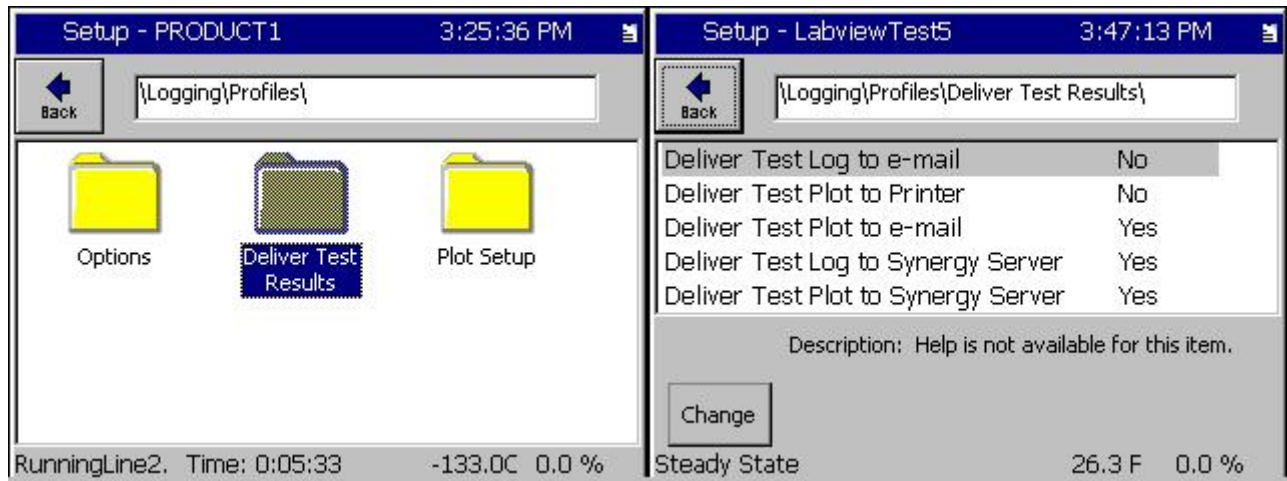
Note that in addition to their ability to deliver test results to the Synergy Server, Synergy Controllers can also print hard copies directly to network printers and transmit electronic (PDF) copies via e-mail.   Enable the **Log Each Profile** option to use any of these features.

Note that the Actions in the drop down list in the **MAINTENANCE\File Utilities\Actions** and **SETUP\Logging\Actions** folder can be manually executed on all of the stored profiles on the controller as shown below.
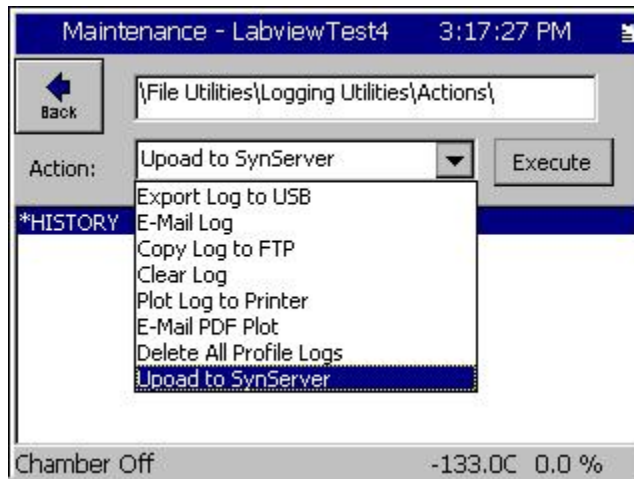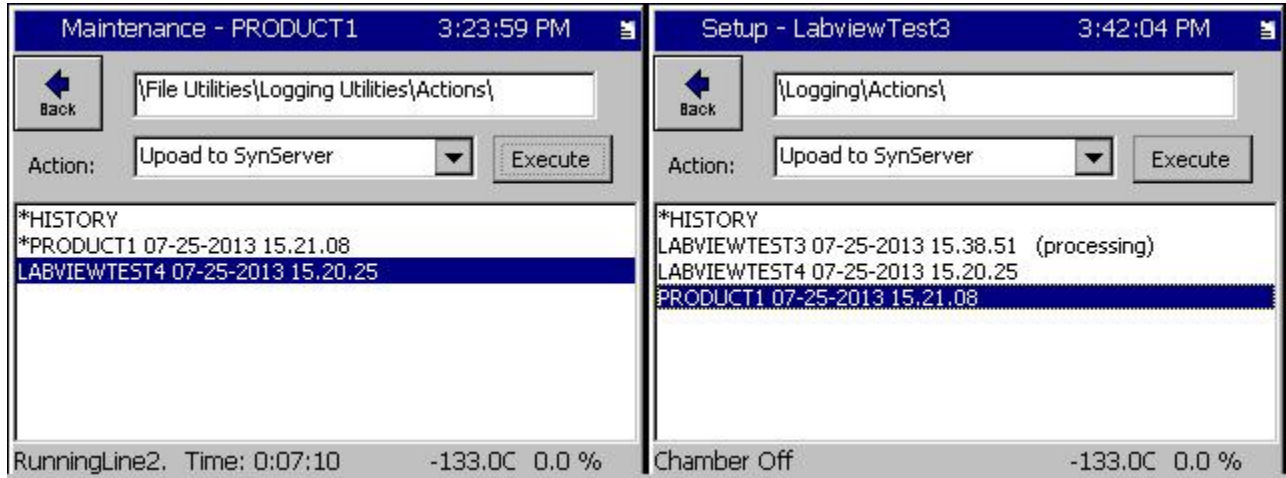
To retrieve a plot from the Synergy Server, click on the **Download Plot** link next to the test results.
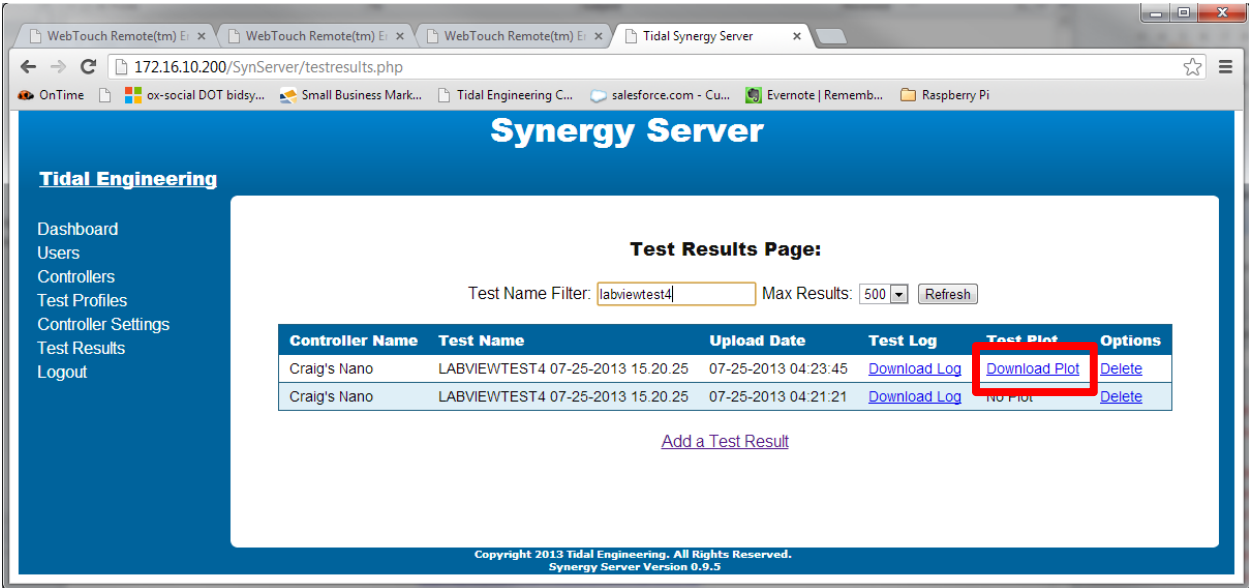
The browser will download the plot in Adobe PDF format as shown below.
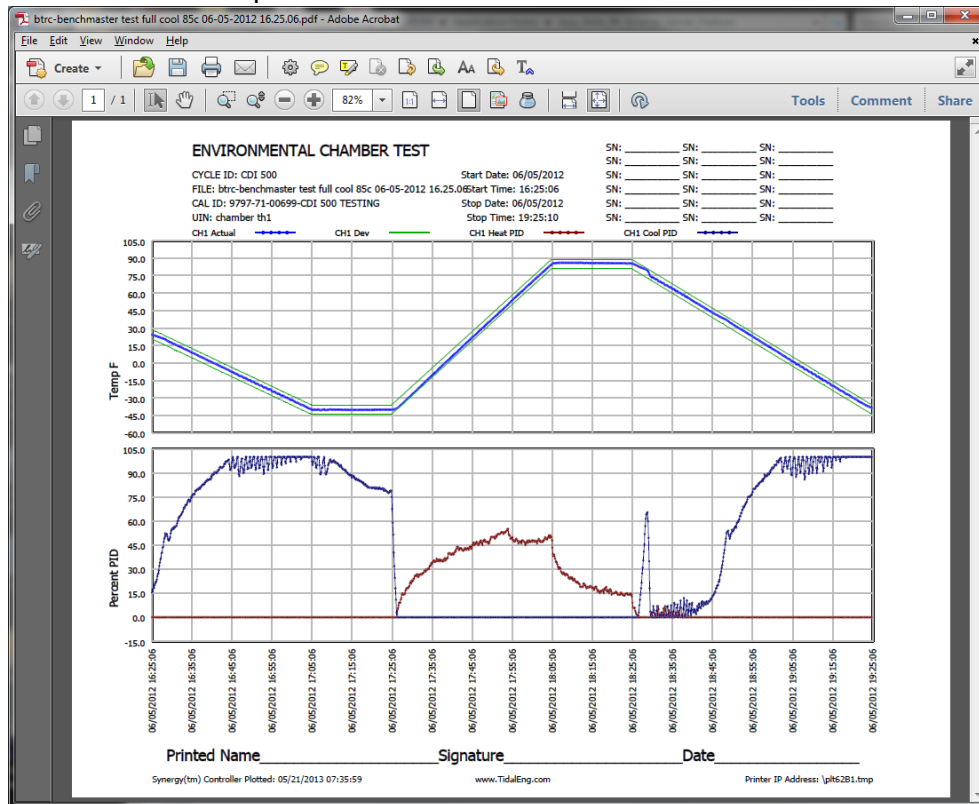
See Synergy Controller Application Note 90 for Synergy Controller plotting setup or watch this video:
http://www.tidaleng.com/Network_Printing/Network_Printing.html

To retrieve a log file from the Synergy Server in CSV (Comma Separated Variable) format, click on the **Download Log** link next to the test results.

Test Log example

2   Synergy Server Installation

2.1   VMware Player Setup

To setup the Synergy Server appliance on a desktop or server PC running the free VMware Player
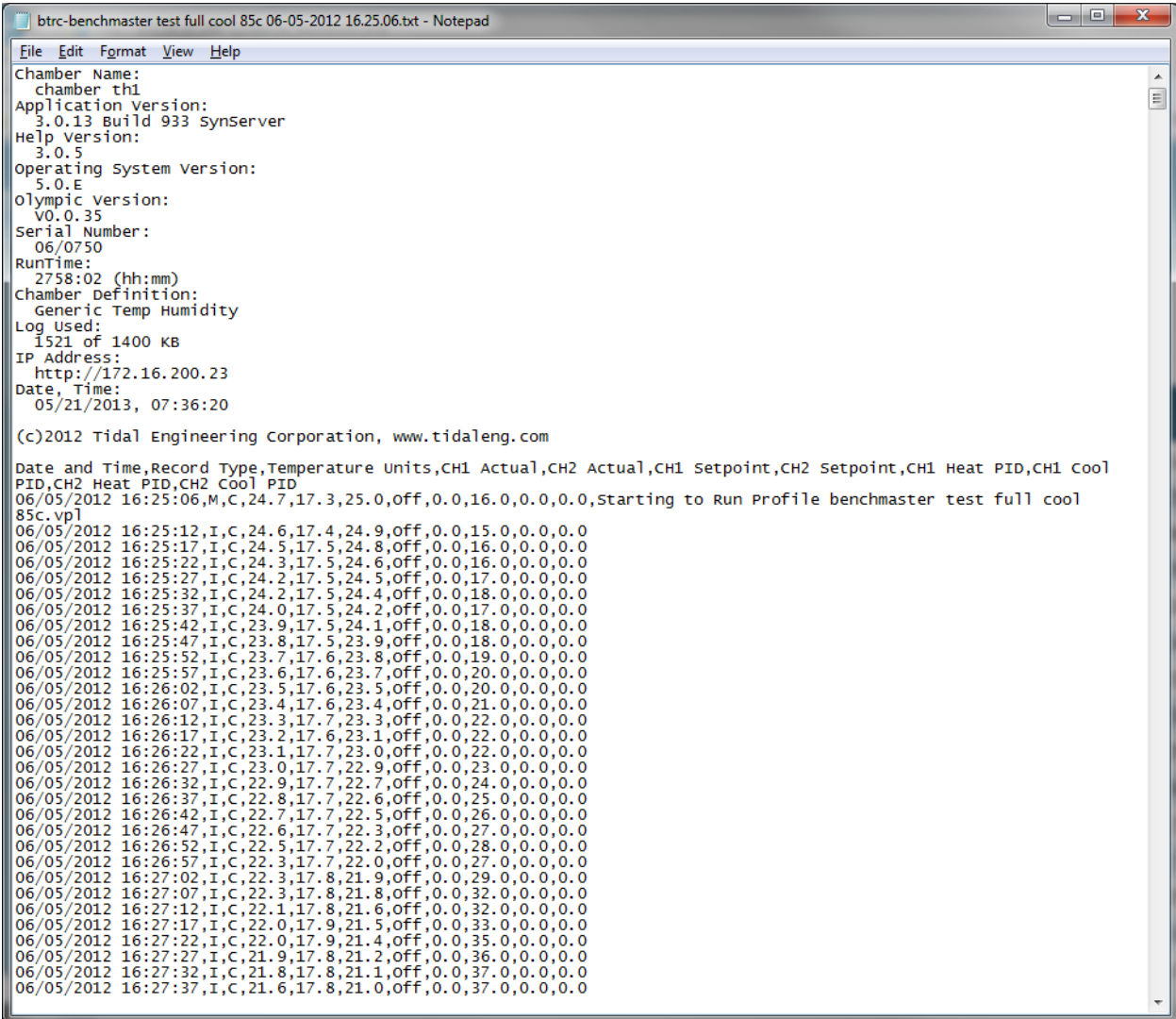
1. Download and install the latest VMware Player from
   https://my.vmware.com/web/vmware/free#desktop_end_user_computing/vmware_workstation_player/12_0
2. Download and install the Synergy Server Appliance from the www.tidaleng.com.

Run the installer and click "Next"

Check "I accept the terms in the license agreement", and click "Next".
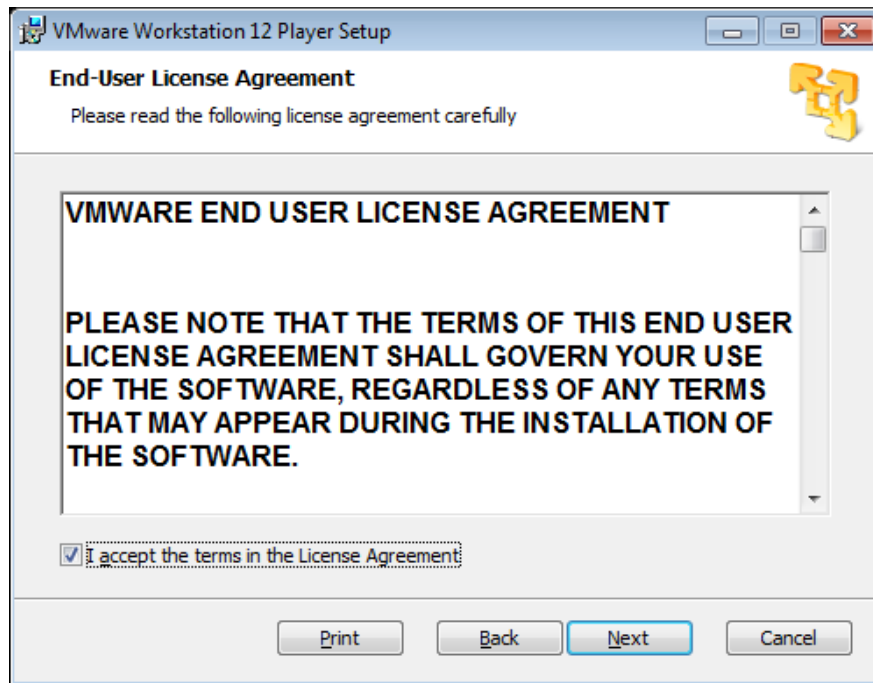
Install to the default location or press Change to select an alternative location. The appliance files can also be installed on a different drive. Click "Next" to continue.
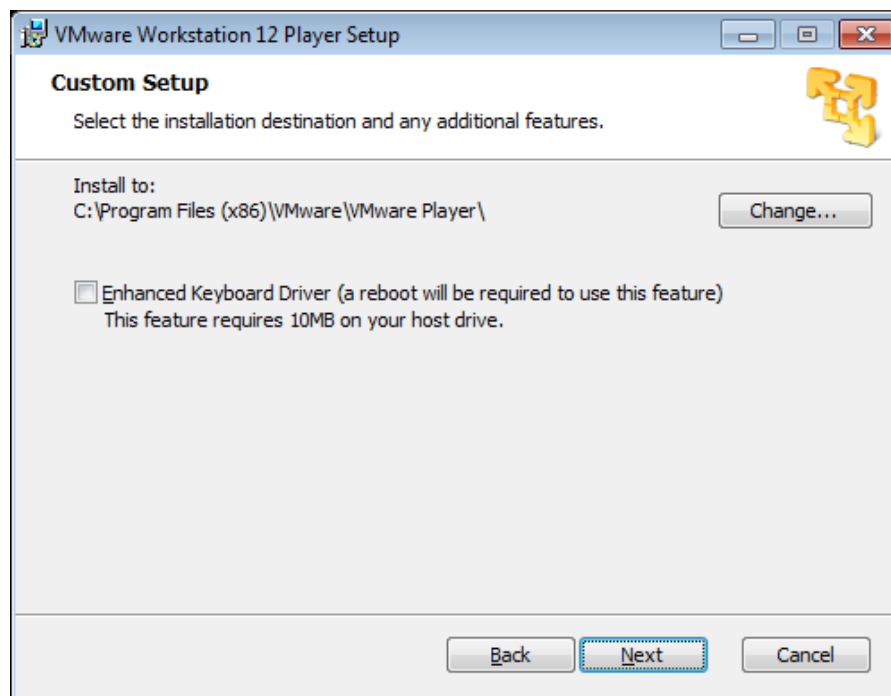
Uncheck the option "Check for product updates on startup". Set your preference for the " Help improve VMware Workstation 12 Player" option. Click "Next" to continue.
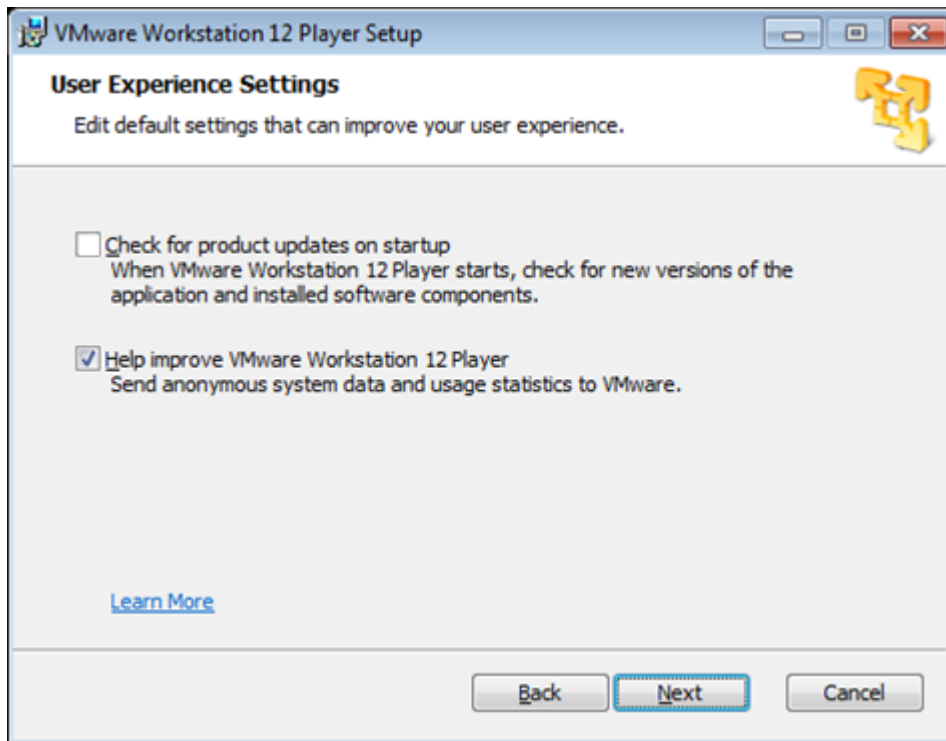
Select the VMware player shortcut options and click "Next" to continue.
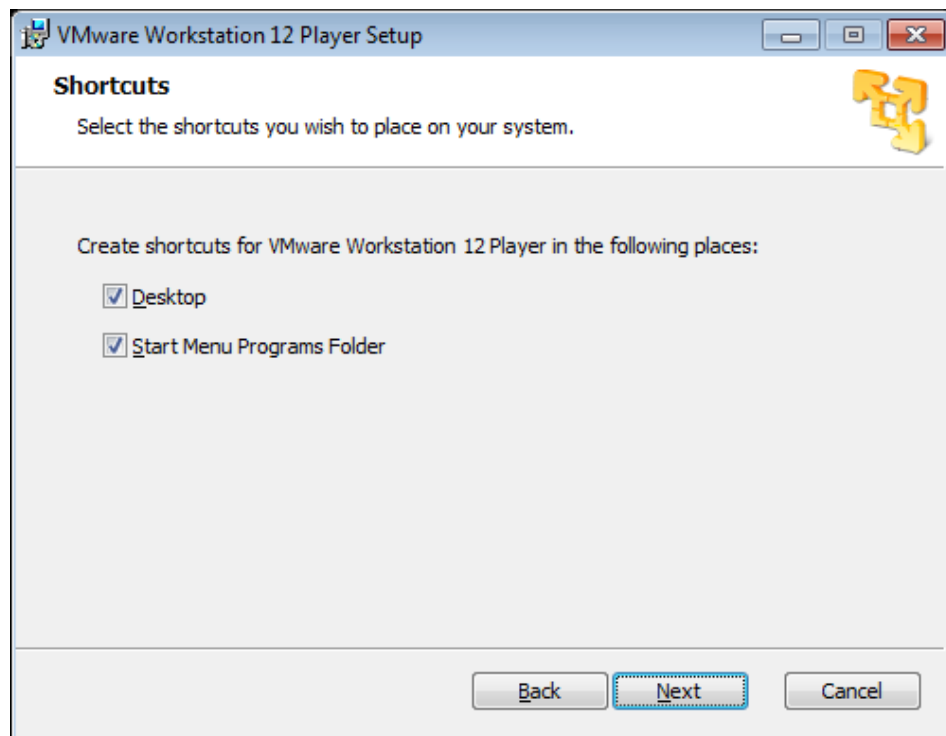
Click **Install** to being the installation.
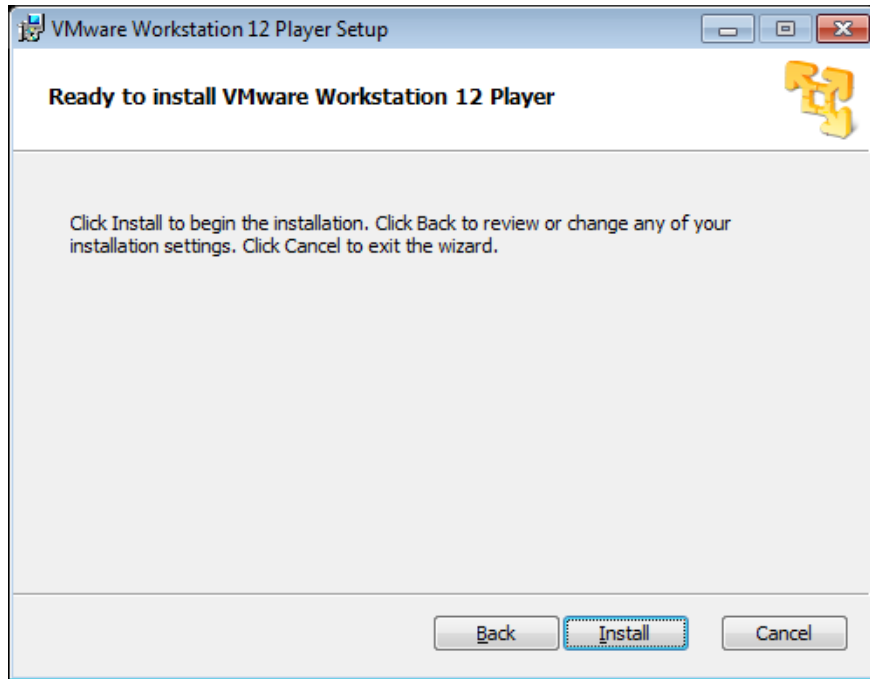
VMware Workstation 12 Player installation will provide progress feedback as shown below. When complete, the installer may require a reboot to complete.
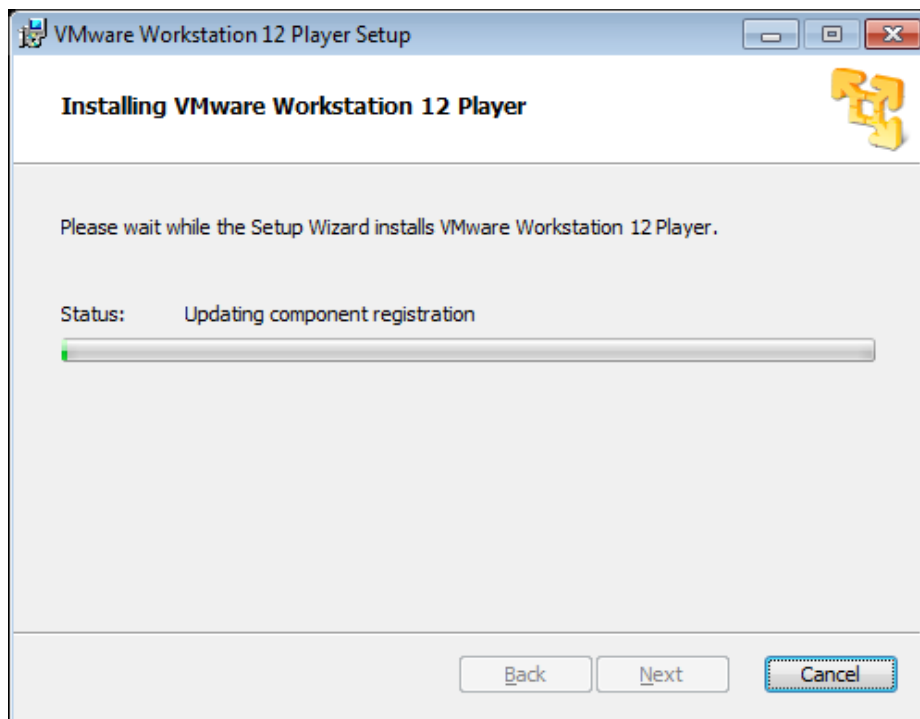
Click **Finish** to complete the installation.

You can launch VMware Workstation 12 Player from the desktop icon, if you selected that option, or from the

Windows Start menu. Look for the VM Ware icon:

2.2   Synergy Server Extraction
The Synergy Server appliance is distributed as a zipped file in a range of VM resources; file storage/RAM.

Small Installation   80GB/2GB
Medium Installation   500GB/2GB
Large Installation   1TB/4GB

Download the file using the link provided by Tidal Engineering and extract it to a temporary location. This location can be different from the final location for the VM. The VM file format can run in a variety of VM systems, and a copy will be made when it is imported later. That copy will require sufficient disk space for the VM to grow to its full extents. The initial copy must just fit the files extracted from the zip file temporarily.

Double click on the zip file to open it up, then select the files and drag them to the temporary drive and folder location. Remember where the files were extracted, you will load them into the VMware Workstation Player in the next step

2.3 Loading Synergy Server into VMware Workstation Player

When VMware Workstation Player is run for the first time you will have the option to create a new VM, open a VM, and several other choices.

Once the Synergy Server files have successfully extracted, open the VMware Workstation Player and click "Open a Virtual Machine" on the right hand side of the startup screen as shown below
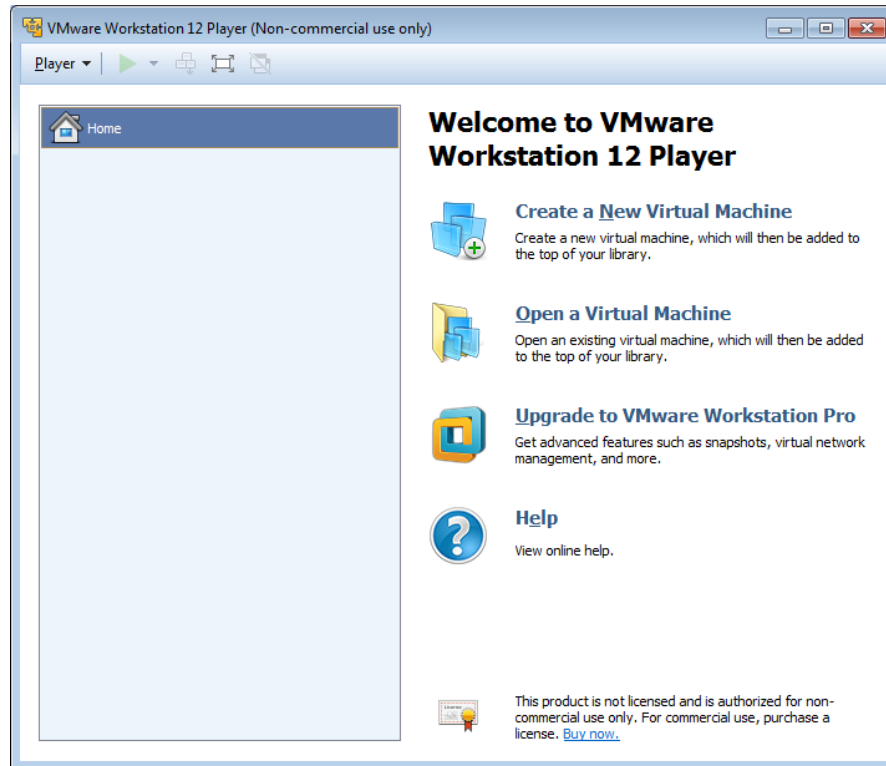
Browse to the location from the previous step, select 'Synergy Server', and click 'Open' in the File Open dialog window as shown below.
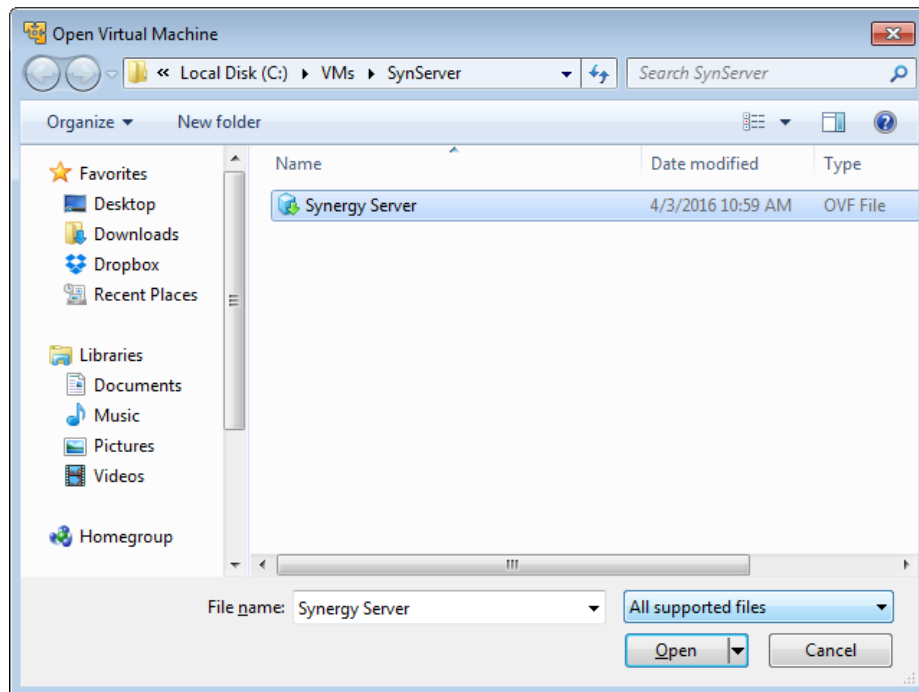
After clicking 'Open', the player will prompt you to choose a name for the Virtual Machine (default is Synergy Server), and a storage path for the new VM instance. This location must have sufficient disk space for the VM to grow to its maximum size. (Note that if the VM runs out of storage space there will be data loss.)
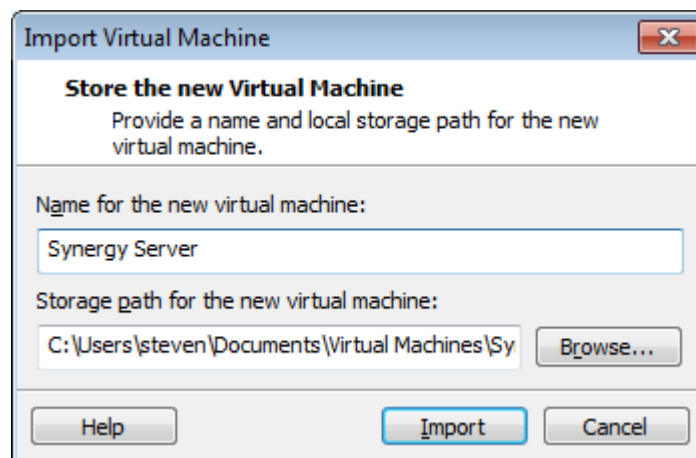
Once the Storage Path is set, click 'Import' to create and import the Synergy Server VM. A progress window will appear. The Synergy Server will be listed when the player finishes importing the VM as shown below.

The Synergy Server is now ready to run.

2.4   Running Synergy Server

Start the Synergy Server VM by selecting 'Synergy Server' (or whatever name you provided in step 2.3) and click the Play Virtual Machine link on the right.
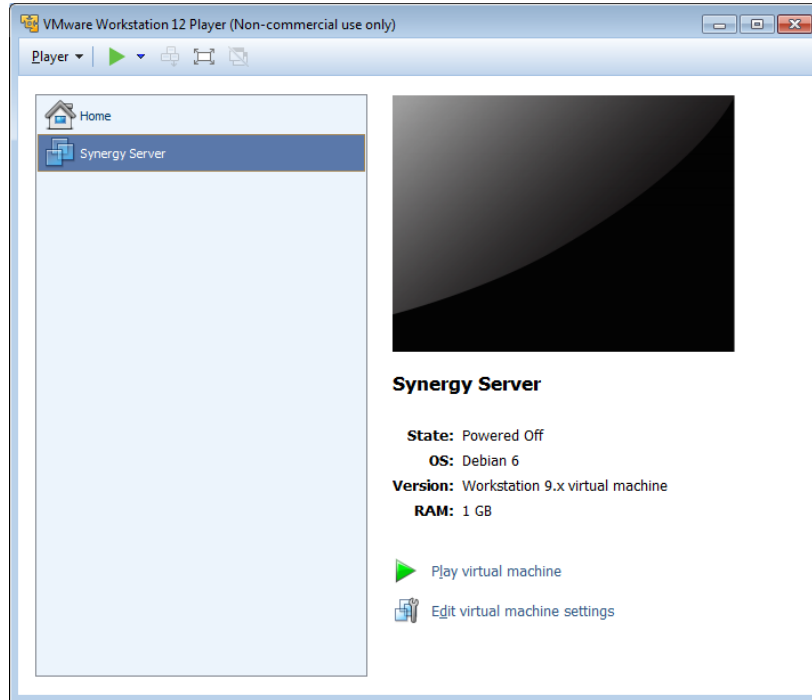
The VM will display the scrolling text as the VM boots the Linux operating system. Once the booting process completes, the TurnKey Linux Configuration Console will appear as shown below (IP addresses may be different):
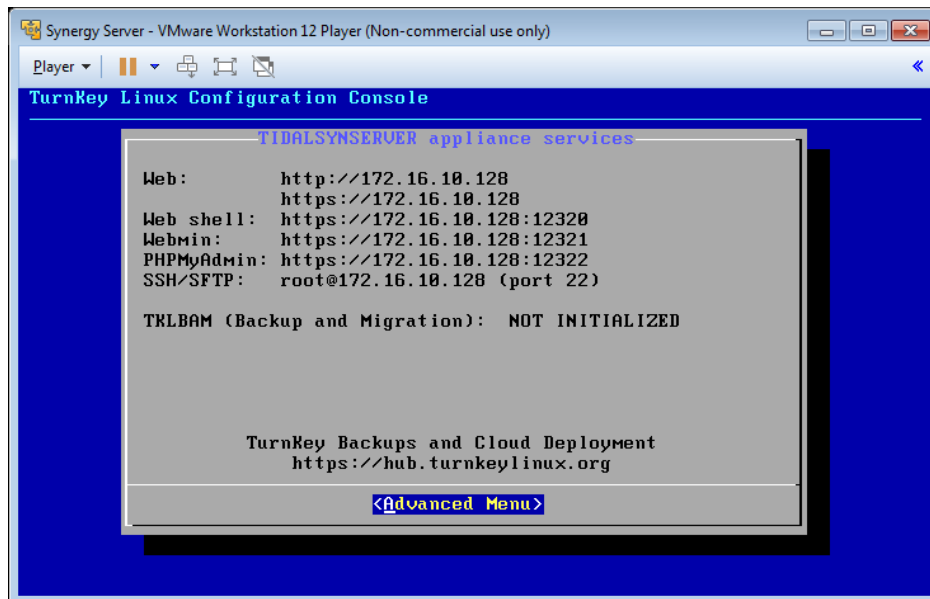
By default, the VM is set to acquire its IP address dynamically each time it starts up. The screen in VMware Workstation Player shows you the current IP address of the VM. You can now connect to Synergy Server with your web browser at http://IP/SynServer where IP is the address of the server.

2.5 Stopping Synergy Server

The Synergy Server must be shut down properly to protect against data corruption. To do that, go to the VMware Workstation Player window and click within it with the mouse. Note that the mouse will not respond once the VM has the focus but keyboard commands will work. With '<Advanced Menu>' selected (using the up and down arrow keys), press the Enter key. The screen will list several options. Click the up and down arrows until 'Shutdown' is highlighted, and then press the Enter key.
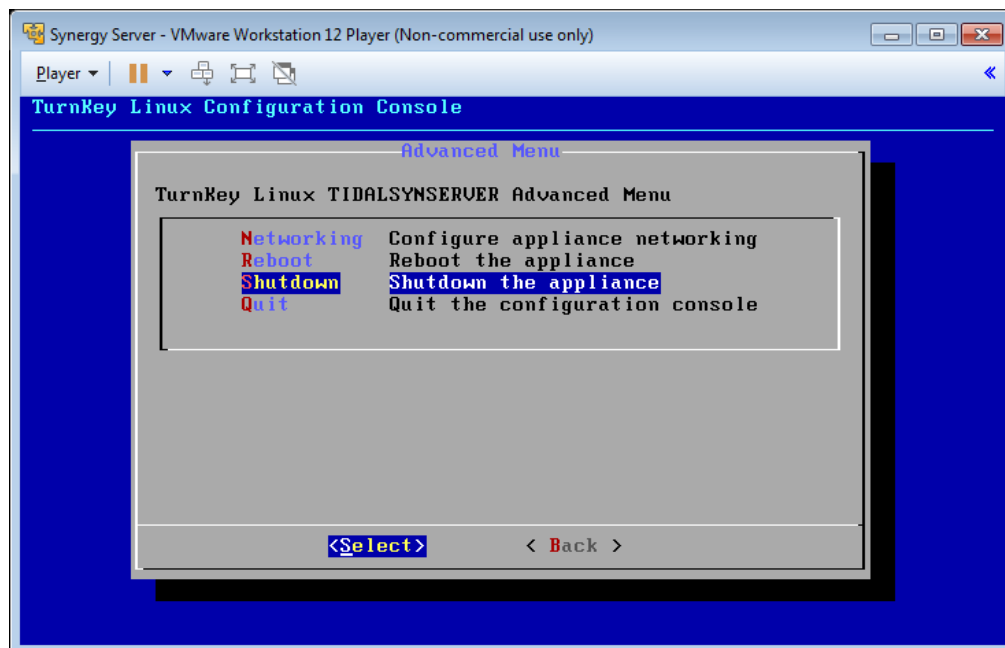
When prompted to 'Shutdown the appliance', make sure 'Yes' is highlighted, and press the Enter key.
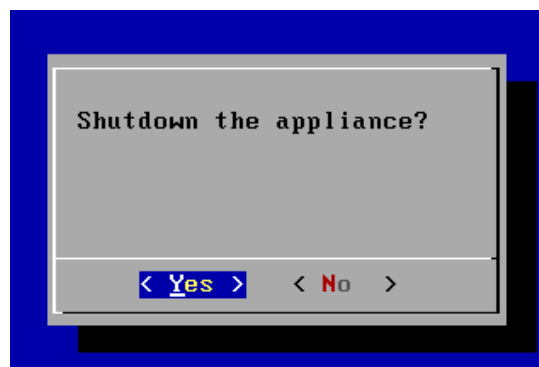
The appliance will start to shut down. Text will scroll by and then the screen will close.
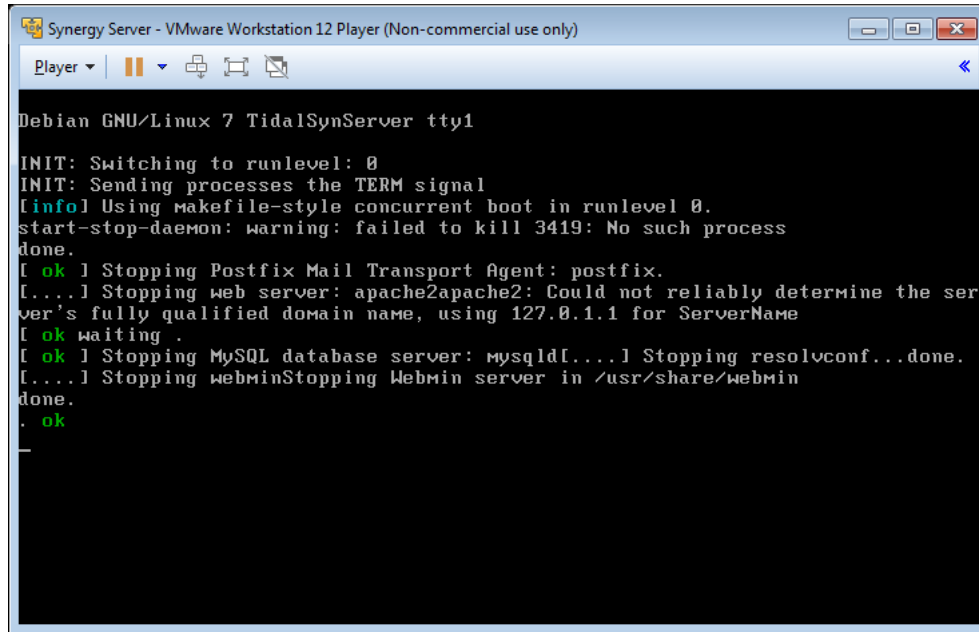
The VM is now safe to turn off.

2.6 Administrator Login

Log into the Synergy Server as the administrator to add users. See section 1.3. Note that the default administrator user name and password are Admin and Admin.

When adding controllers, add the controller on the Synergy Server controller page and then setup the Synergy Controller (Nano, Quattro, Micro 2) from the controller touch screen (or WebTouch Remote™). See section 1.4

SYNERGY Server Log In Screen

Press **Logout** menu at any time and the Synergy Server Log-in Screen will appear.

3 Synergy Server Administration

This section describes the administration of the Synergy Server. The following administrative tools are designed for use by an IT department.

3.1 Date and Time Setup

Setting the date and time on the Synergy Server is done through a web portal on the Synergy Server itself. Open the Synergy Server Webmin page at port 12321. Enter https://IP:12321/ in your web browser (with the IP of your server as shown in section 2.4). Accept the insecure certificate (which is safe and normal for this site).

Login with Username: **SynAdmin** and Password: **SynAdmin** (both are case sensitive) to open the main Webmin portal. From this portal you can control and administrate the appliance.
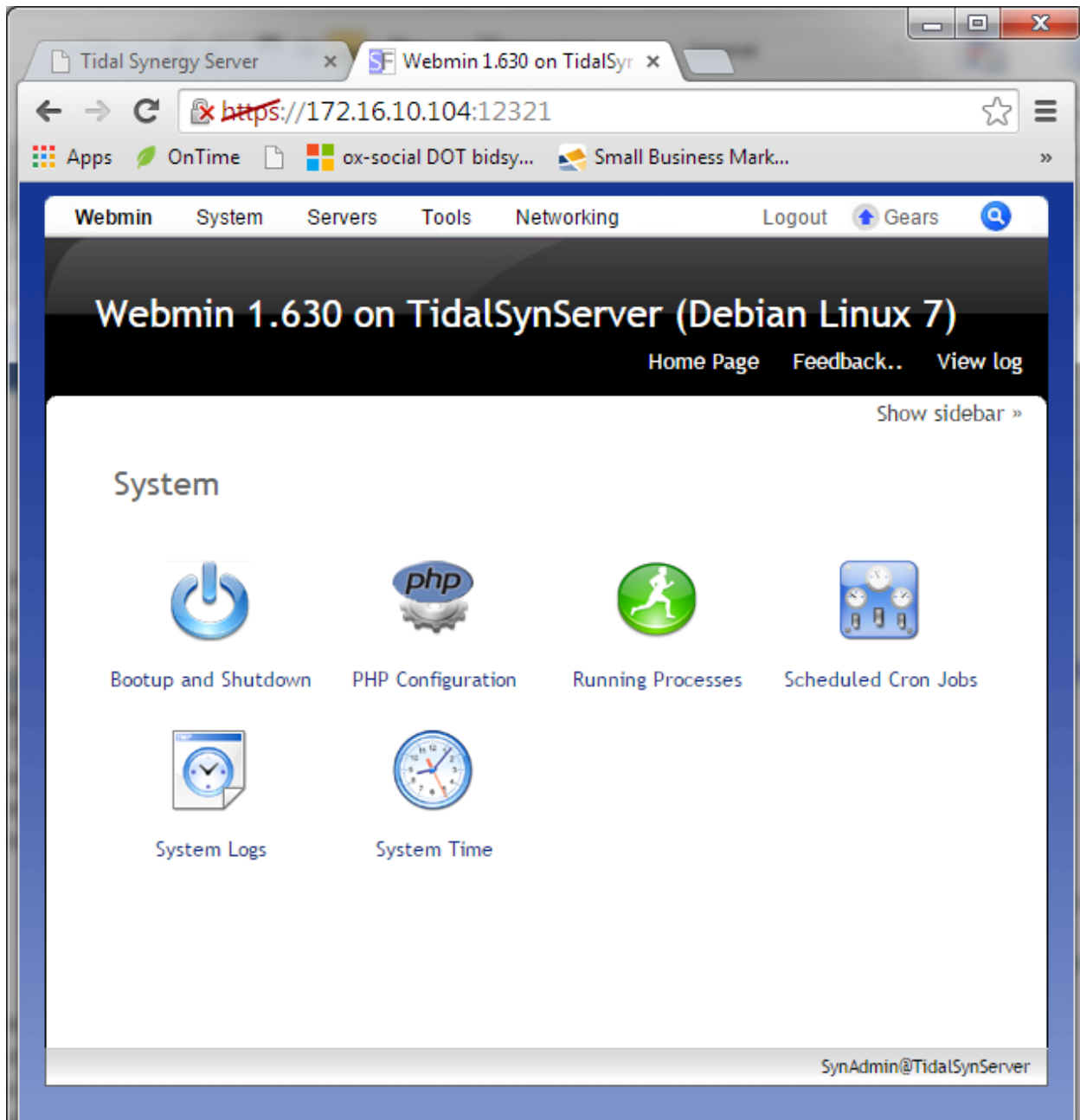
To set the appliance date, time and time zone, click on the System Time icon.
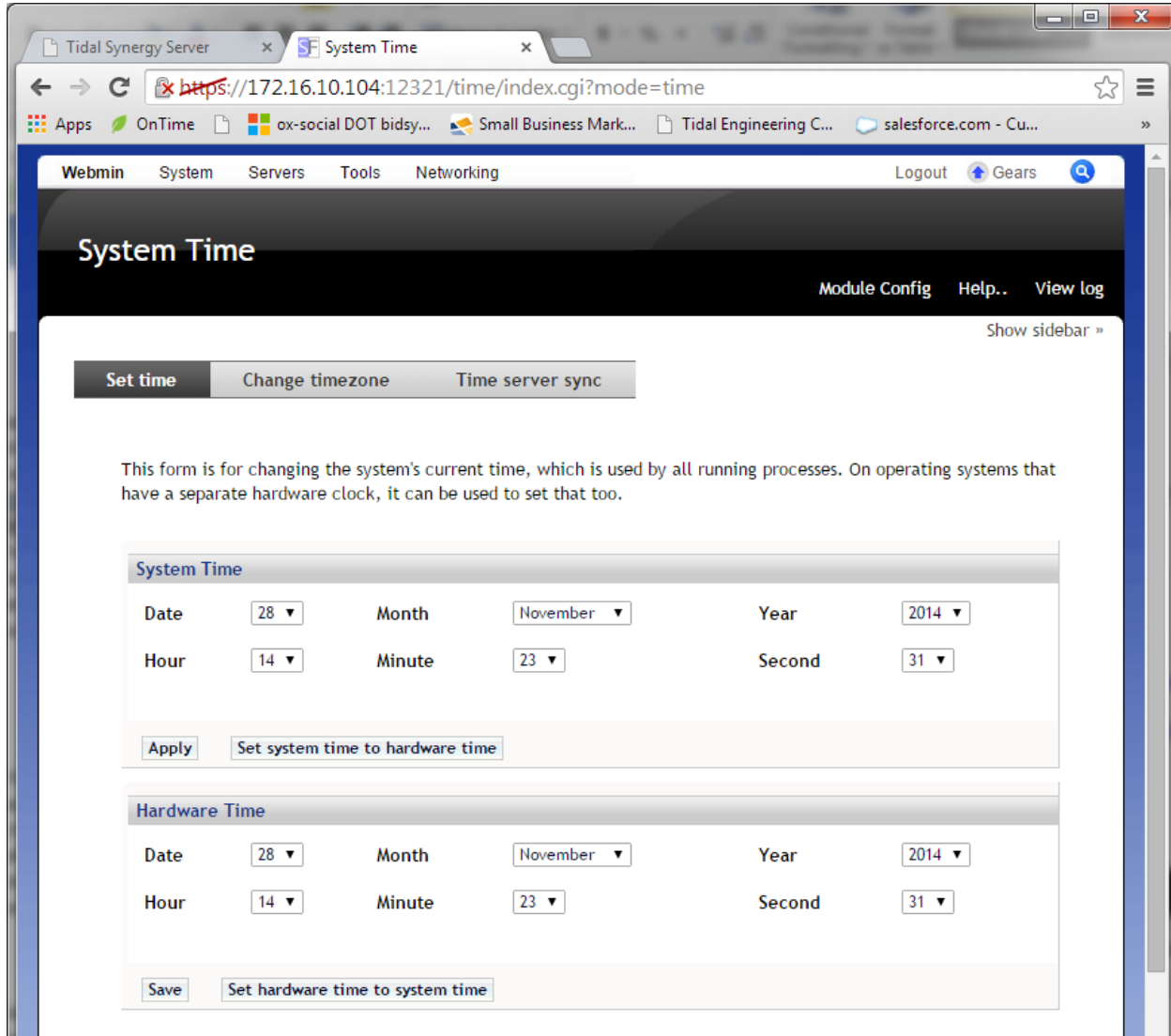
Set the Date, Month, Year, Hour Minute and Second fields and then click **Apply**.

Click the **Set hardware time to system time** button in the **Hardware Time** section

To set the Timezone, click on the **Change timezone** button at the top of the screen, then select the time zone from the dropdown list.

Click the **Save** button.
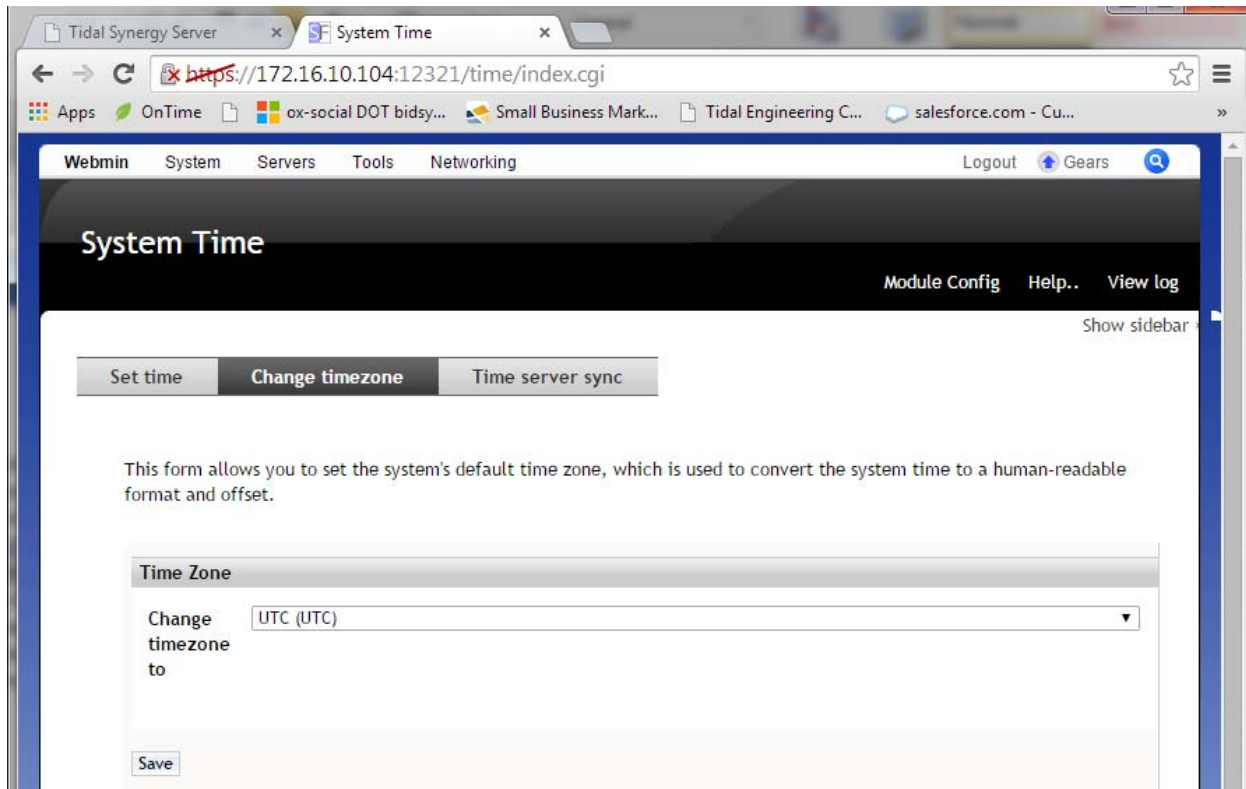
You can also set the appliance to automatically pull time from Internet based time servers using NTP protocol. A list of publically available NTP servers is available here: http://support.ntp.org/bin/view/Servers/NTPPoolServers. For best results, click on the link for your geographical region, and select a regional server, or a server for your country. For example, to find a US time server, click the link above. Towards the bottom of the page is an area table, with hostnames next to the area. Click on north-america.pool.ntp.org

The NTP page lists the top level North American NTP servers, and has a list of countries if you are in other locations. For this example, you can use one of the four servers listed at the top for North American (leave out the word server from before the actual server name), or you can scroll down, and click on United States to see the US time servers.
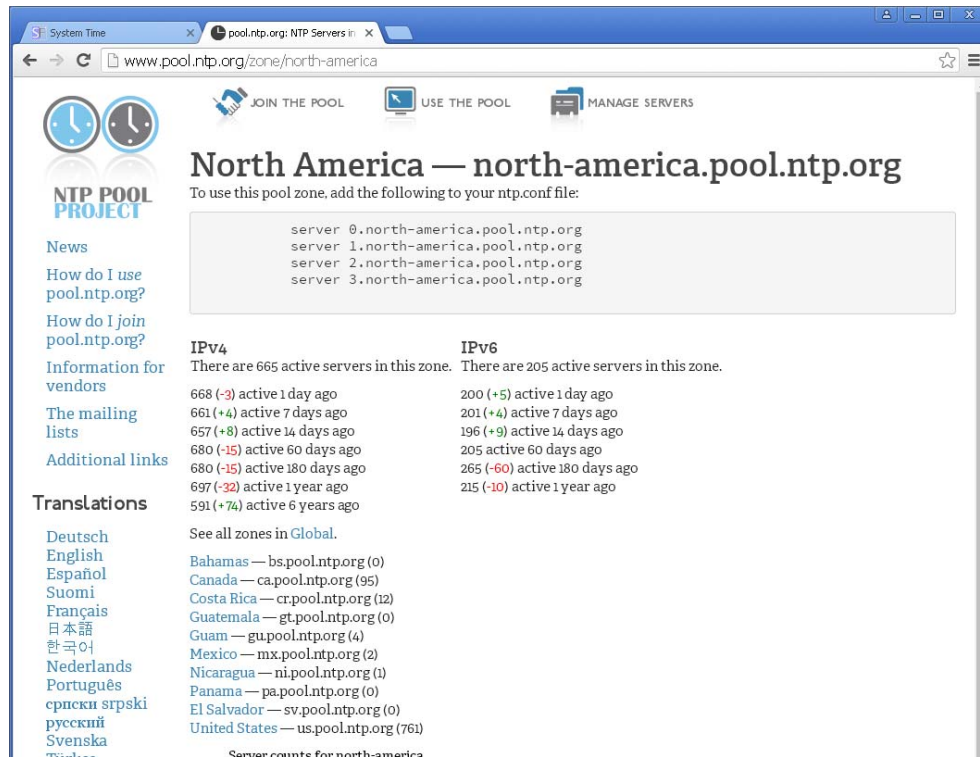
For example, click on the link for the United States to bring up the time servers located within the United States. These are the best choices if you are within the United States.
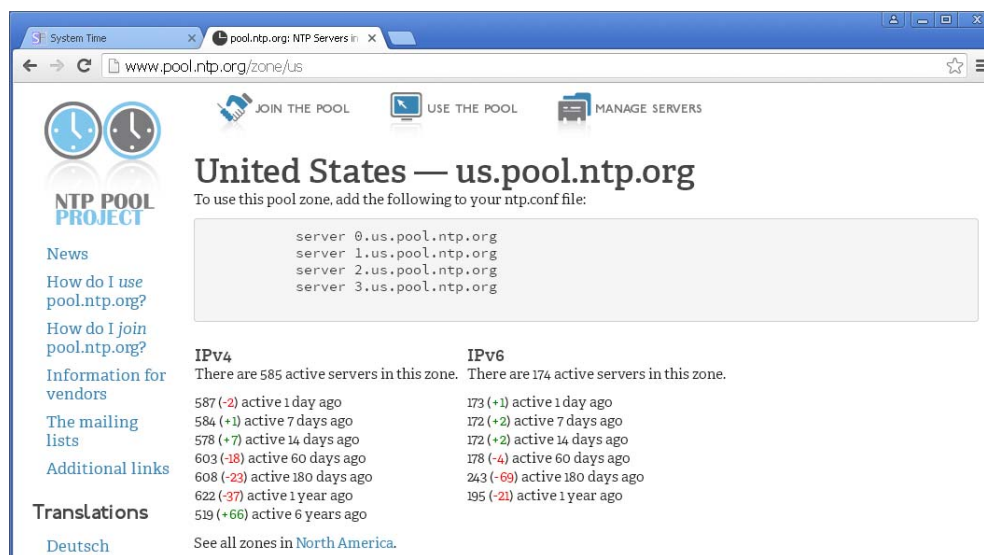
Put in the time server name in the Webmin on the Synergy Server appliance (such as 0.us.pool.ntp.org). Make sure the 'Set Hardware Time too' option is checked. Also make sure **Synchronize when Webmin starts** is set to 'Yes'. Then click the 'Sync and Apply' button.
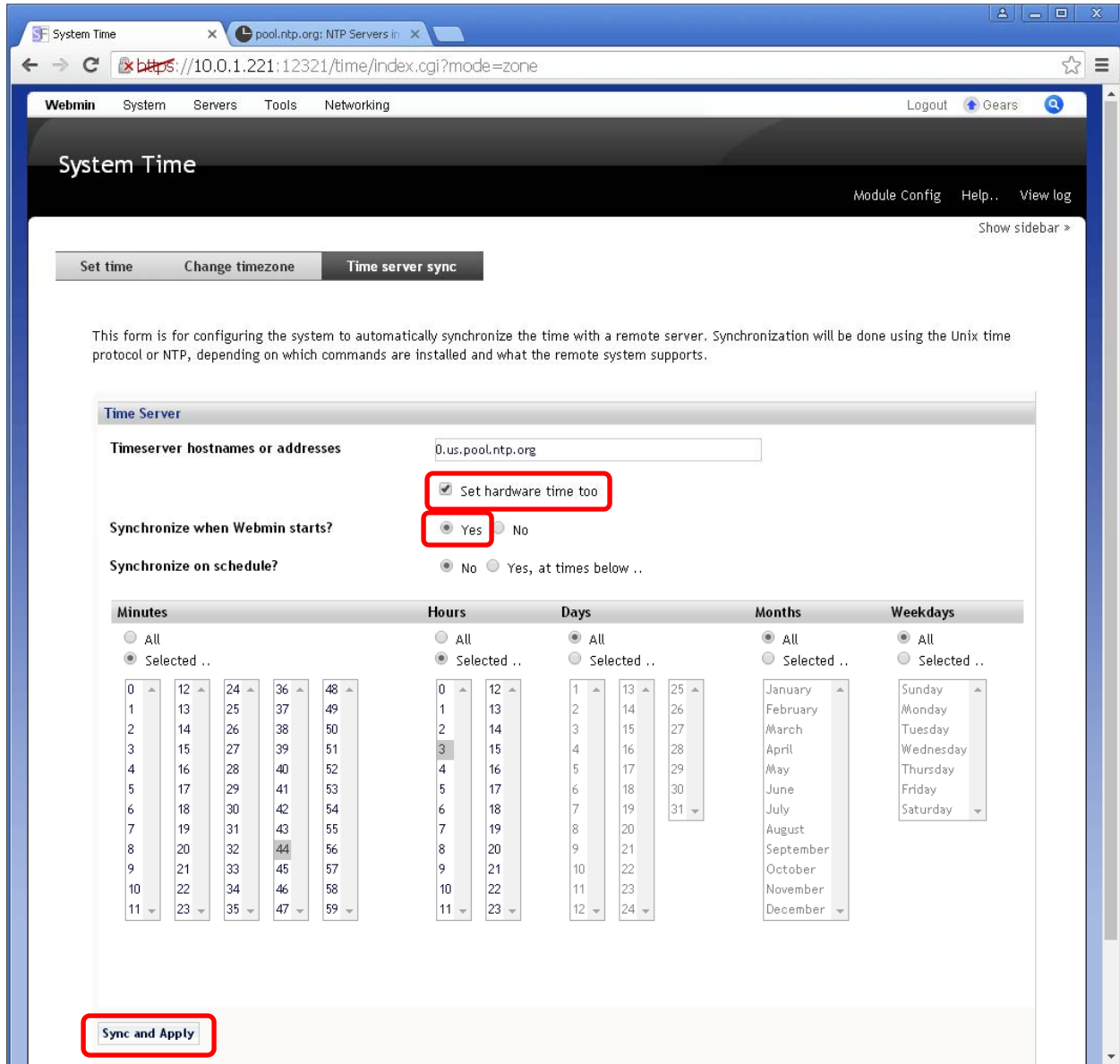
The time has successfully been setup on the Synergy Server. You can log out of Webmin by clicking the Logout link in the upper right hand corner
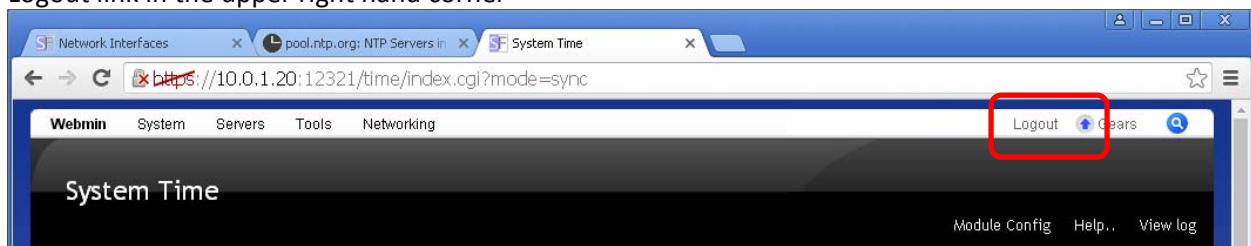
3.2 Static IP Address Assignment

When using any system as a server, it is advantageous to have a static IP address so the system will always use the same IP address. This is important because your Synergy Controllers will lose communications if the appliance IP addresses changes. Loss of communications could result in data loss.

The easiest way to set the IP address on the Synergy Server appliance is from the console of the VMware Workstation Player. It will show the IP of the appliance after booting. Click the mouse within the appliance window to hide the cursor and enable the keyboard. Move the selection until 'Advanced Options' are selected, and press the Enter key.
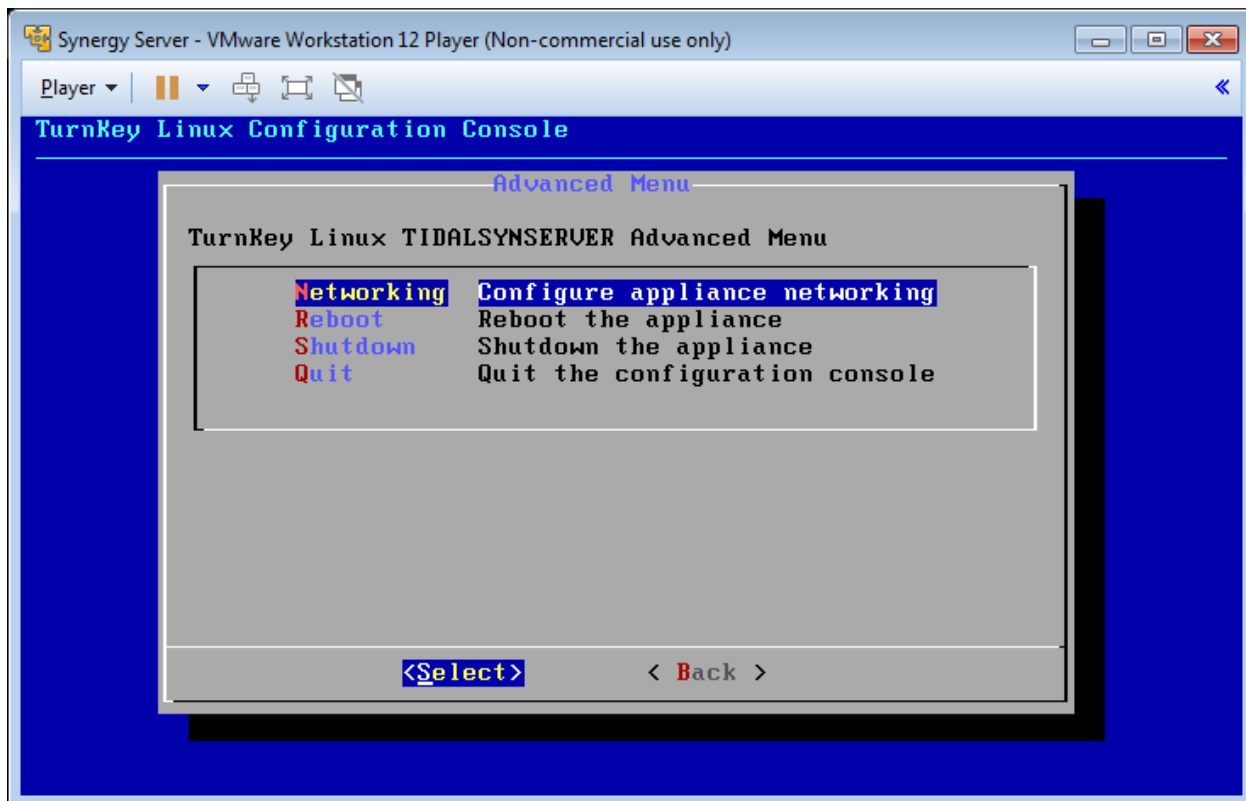
With 'Networking' selected, press Enter again. You will be prompted with two options: DHCP and Static IP.
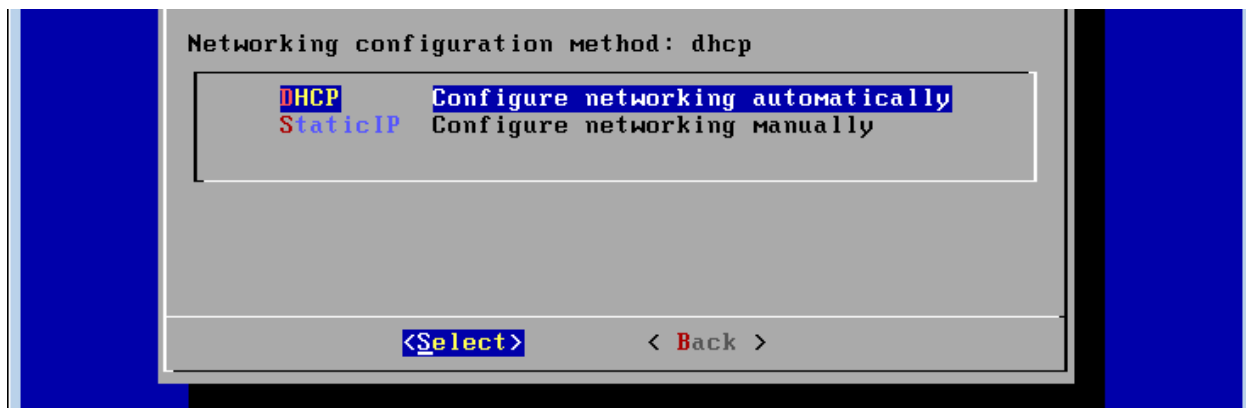
Hit the down arrow, and click Enter when 'Static IP' is highlighted.
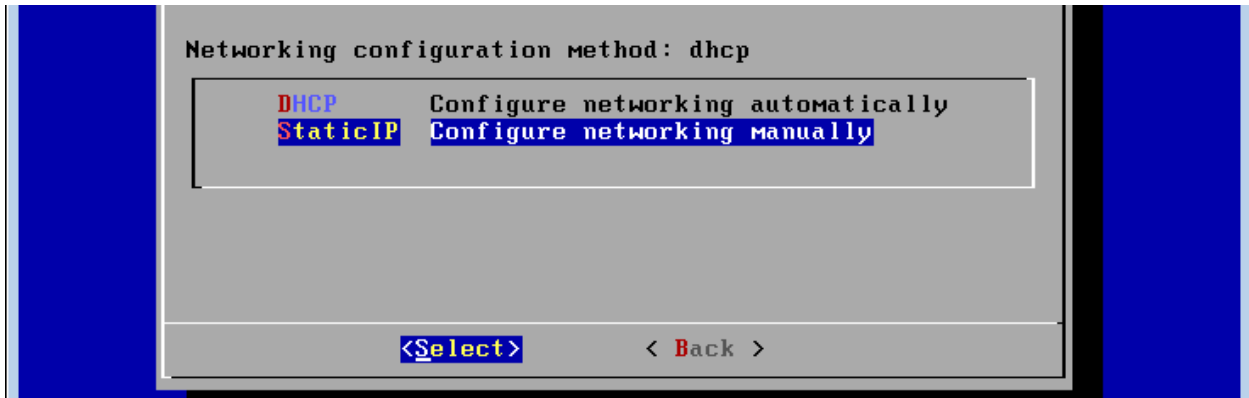
Enter the static IP Address, Netmask, Default Gateway, and at least one Name Server on the form.
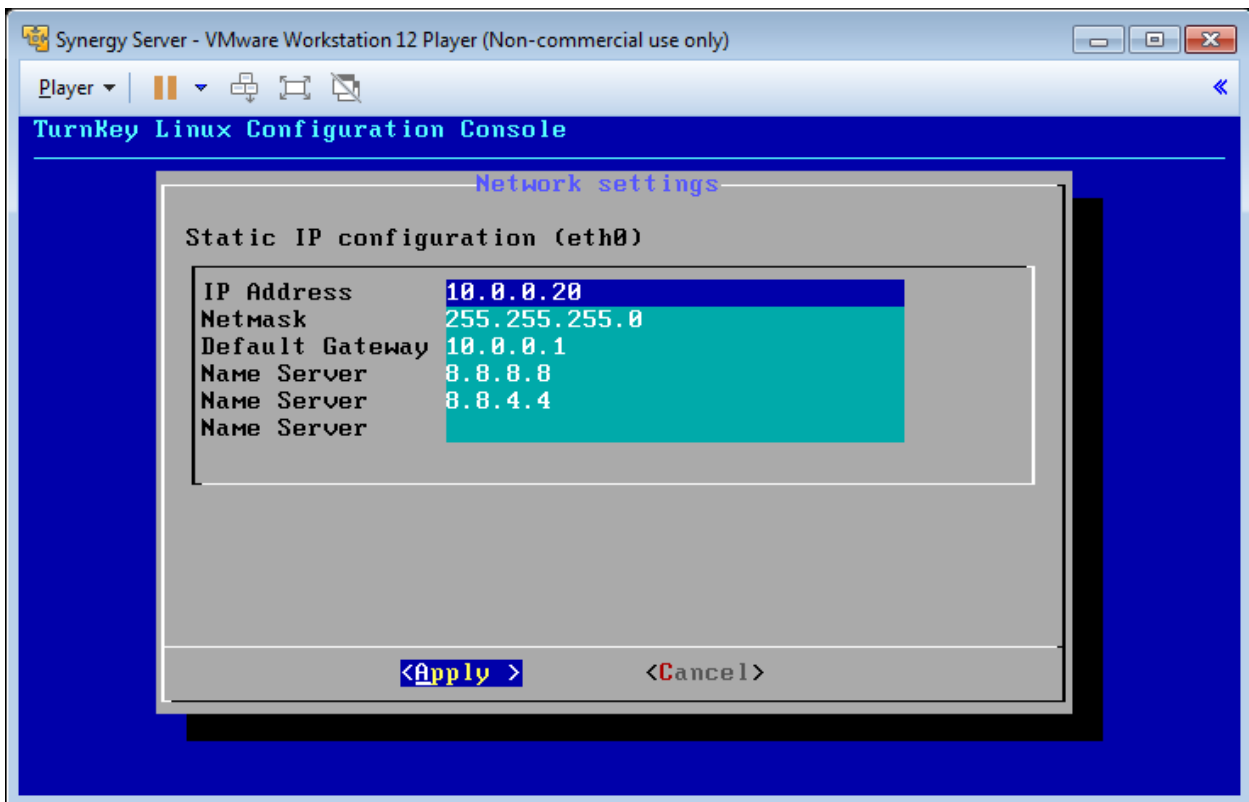
If you don't know the Name Server for your network environment, Google's public DNS server will often work. These IP's are 8.8.8.8 and 8.8.4.4. Contact our IT department for the proper Name Servers if you are unsure. Enter all the fields, hit the Tab key and highlight 'Apply' then hit the Enter key to save the settings.

To get back to the starting screen once the settings have been applied, highlight the 'Back' button and press Enter through two screens. You will now be able to access the Synergy Server on the new IP you hard coded into the appliance.

3.3 Upgrading Synergy Server

The Synergy Server Appliance is upgradable as new functionality is released or issues are fixed. Synergy Server Maintenance page is used for upgrades.

Before performing any upgrades, backup the database and capture a snapshot of the VM.

To upgrade the Synergy Server, open **Maintenance Page** using the **Maintenance** menu on the left hand side of the page. Note that some versions have information about the appliance and links to Webmin as shown below. Click on the **Upgrade Synergy Server** link to start the upgrade process.
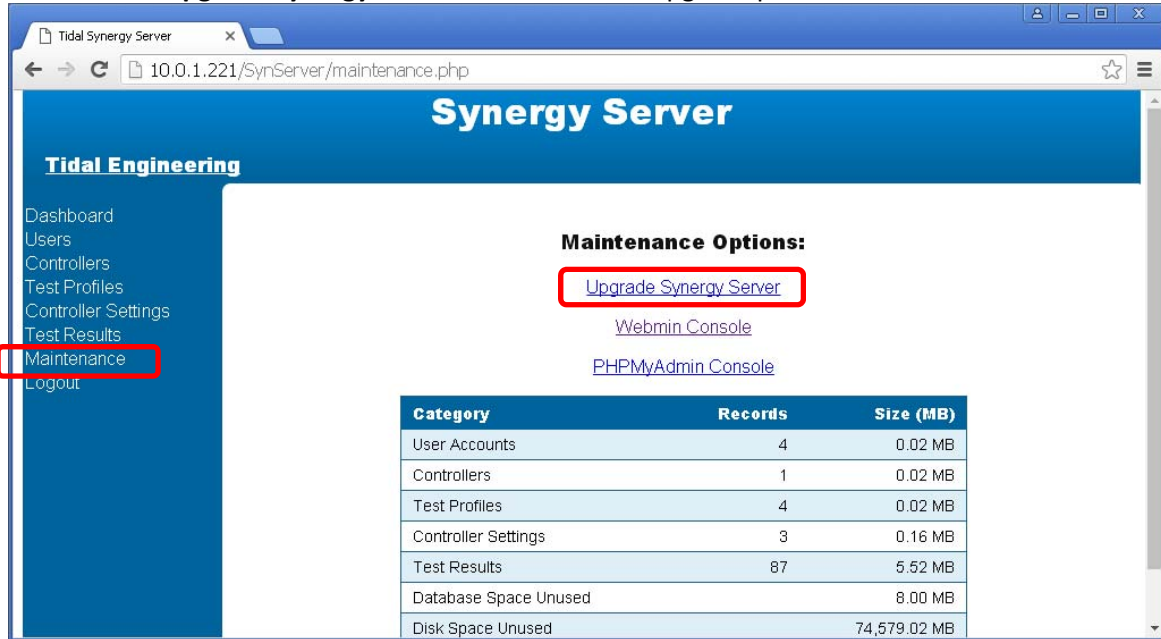
Click the **Choice File** button to select the upgrade file.
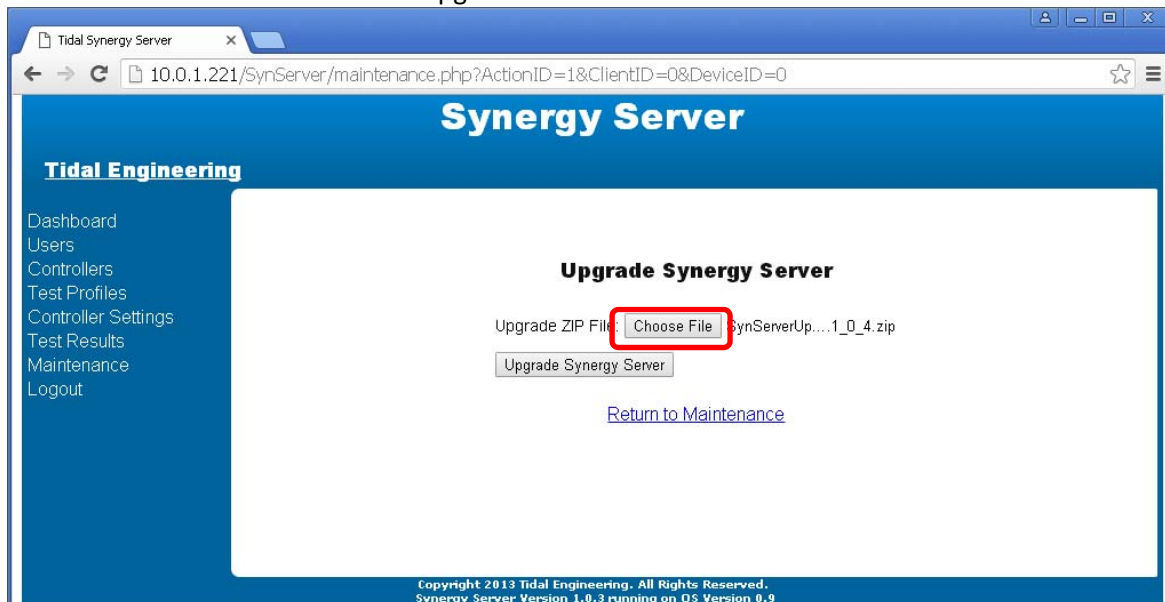
Once you have selected the appropriate file, click the **Upgrade Synergy Server** button. The Synergy Server will upload the file and check the MD5 Hash for consistency to verify there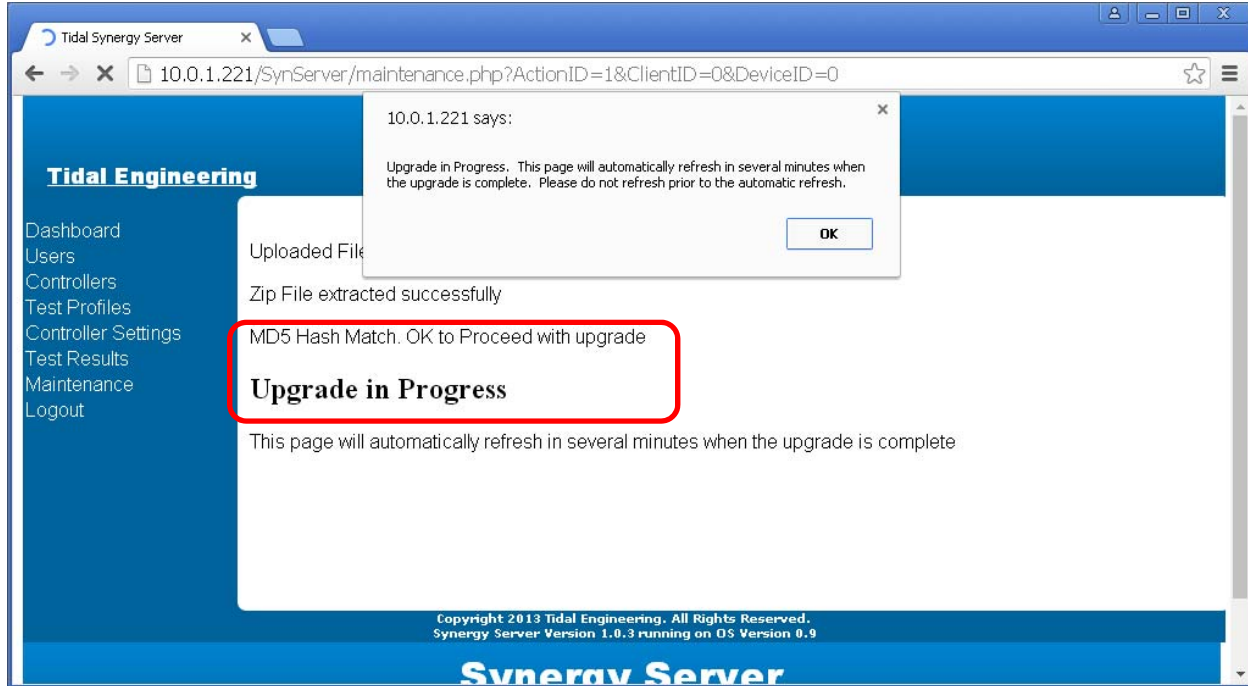 are no errors in the file. The page will indicate the results of the consistency check and that the upgrade has started as shown below.

The upgrade process s can take several minutes. You won't be able to access the Synergy Server during the upgrade. Browse to The \SynServer\logs folder on the Synergy Server appliance to view the upgrade logs. Look for the log with the appropriate date-time stamp. (Note that although the log can be open while the process runs, it must be refreshed to see changes).
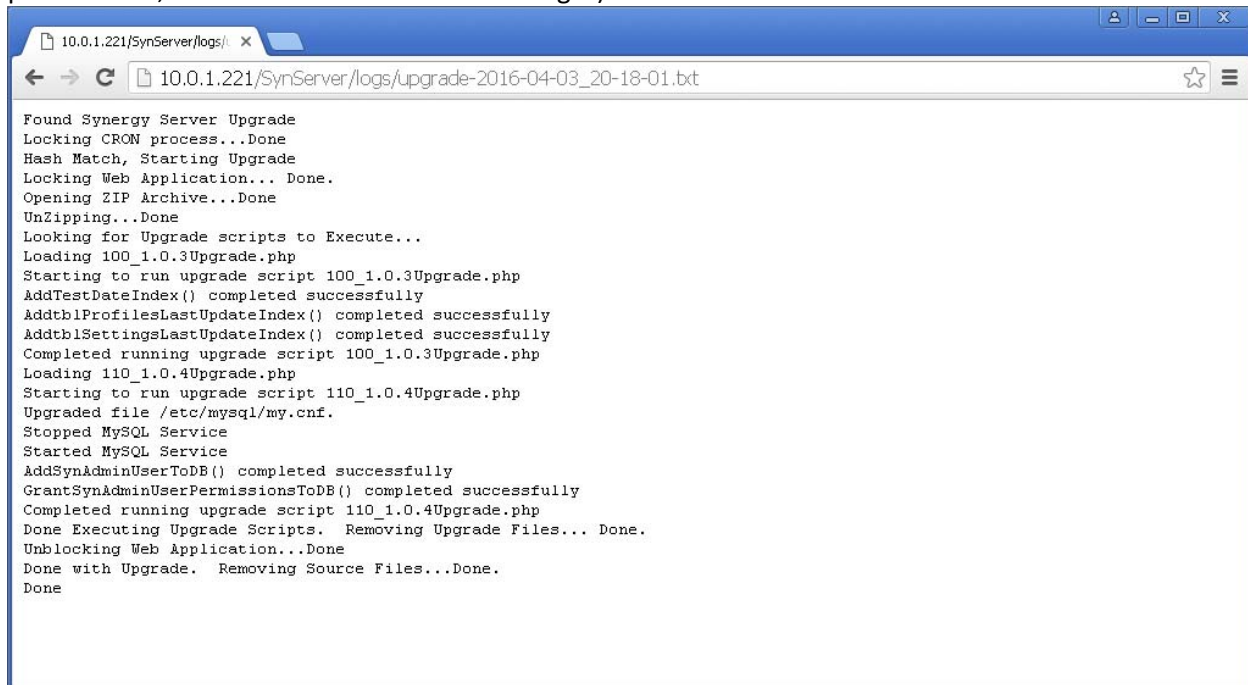
The last line of the log file will be 'Done' when the process is complete. Refresh the Synergy Server website in the browser to open the new version. Verify the new version number at the bottom of each page in the Synergy Server.

3.4   Database Backup

MySQL backup tools are commercially available to backup and restore the database to another computer. Backups are obviously important to safeguard the data against hardware failure and corruption. In addition, backups can be used to move the database to a new computer or a larger VM if the database grows to a point where the backup will not fit on the storage allocated to the VM.

Important: Take a snapshot with the VMware Workstation Player prior to the upgrade to protect data against corruption during upgrade. Note that this will not protect data from hardware failure so it should not be used in place of backup to another computer.

Handy Backup Small Server edition is an example of the tools that are available to backup My SQL databases. (http://www.handybackup.net/order.shtml#/business)

This tool can handle backup and restore for large MySQL databases with the option to use multiple locations including cloud storage. The following section uses Handy Backup as an example however the credentials and database selection details are applicable to other backup utilities compatible with MySQL server.
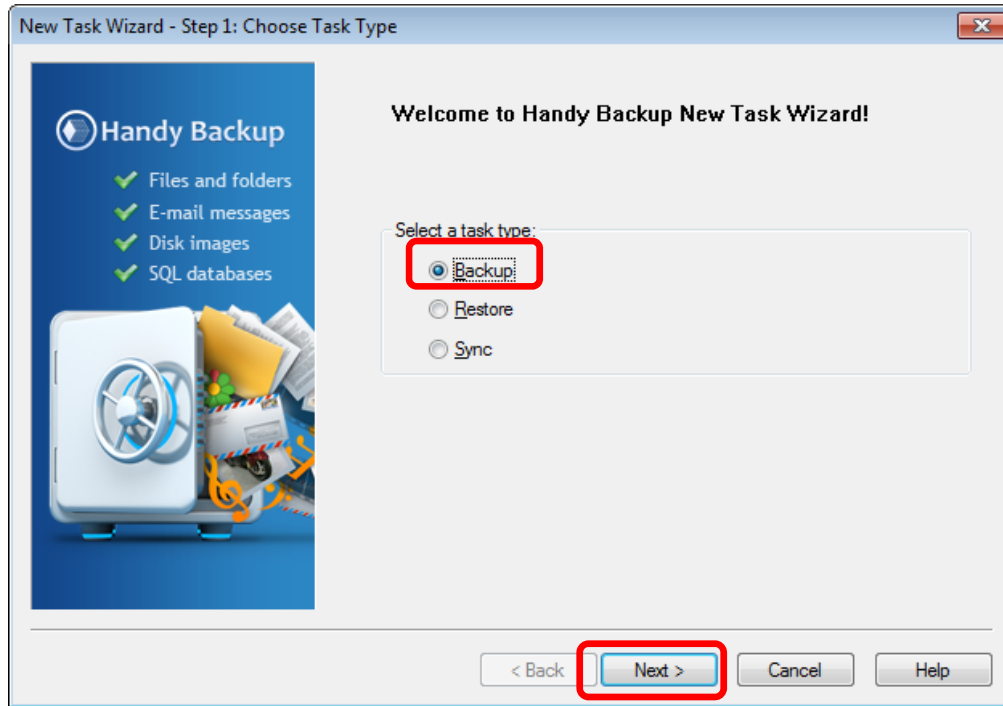
First Download and install Handy Backup and start the application.
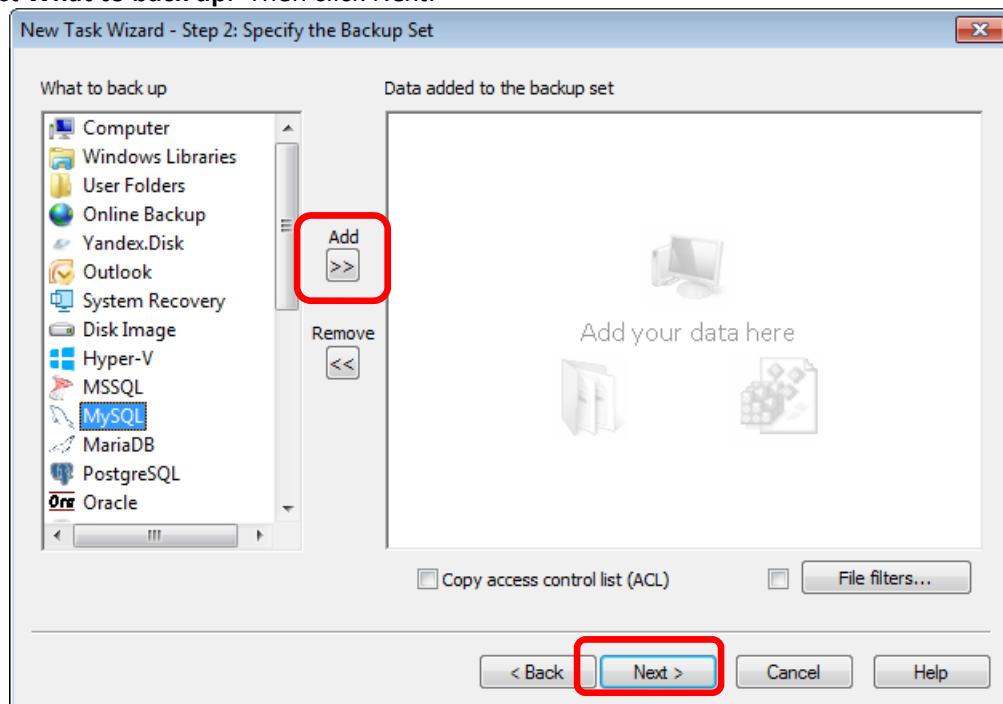Next, setup a new Task to backup the Synergy Server as follows:.
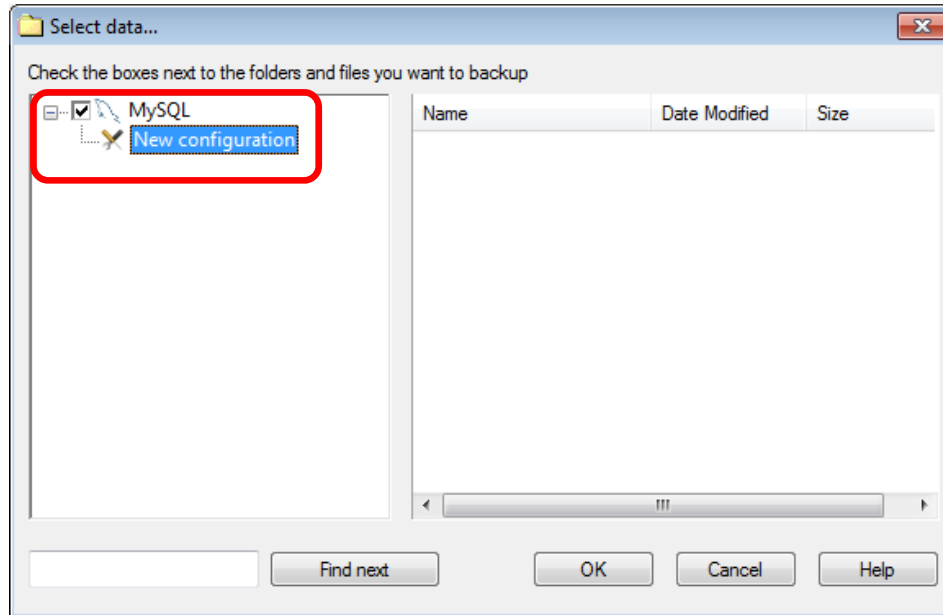1.   Click on File, New Task…to launch the backup or restore task wizard and click 'Next'
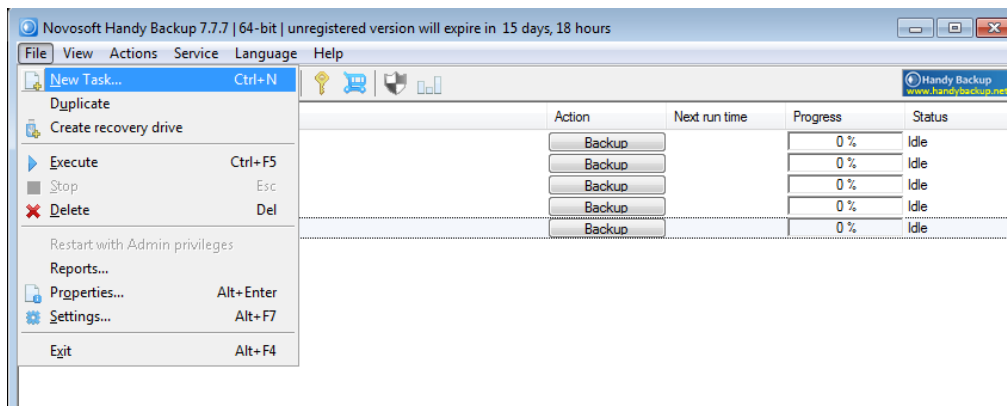
2. Select '**Backup'** and click **Next**.

3. Click on **MySQL** in the list on the left, and then click the Add button between the two columns to select **What to back up**. Then click Next.
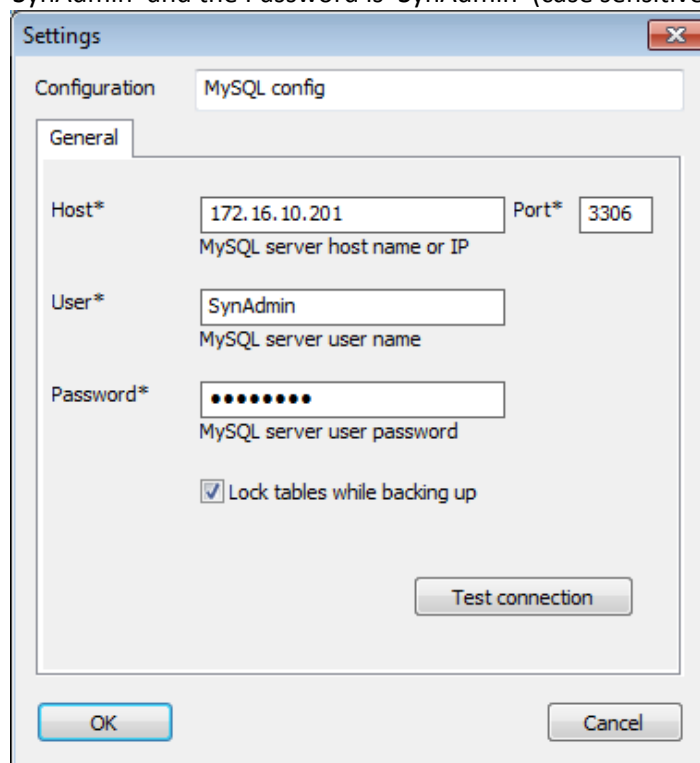
4. Check off the box next to **MySQL** and click on 'New Configuration' to enter information about the MySQL server.


5. Enter the Server information
   The Host entry is the IP address of your Synergy Server Appliance.
   The Username is 'SynAdmin' and the Password is 'SynAdmin' (case sensitive and without the quotes)

6. Then click the 'Test connection' button to confirm communications with the MySQL database within the Synergy Server Appliance. The program will respond with a success message as shown below.
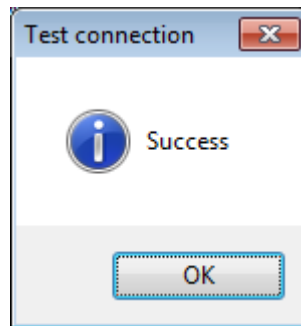
7. Click OK to acknowledge the Success message
8. Click OK on the Settings screen.
9. All the MySQL tables are listed in the column on the right as shown below. Select the **syndata** folder and uncheck the other folders, then click **OK**. The **syndata** database holds all the Synergy Server data.
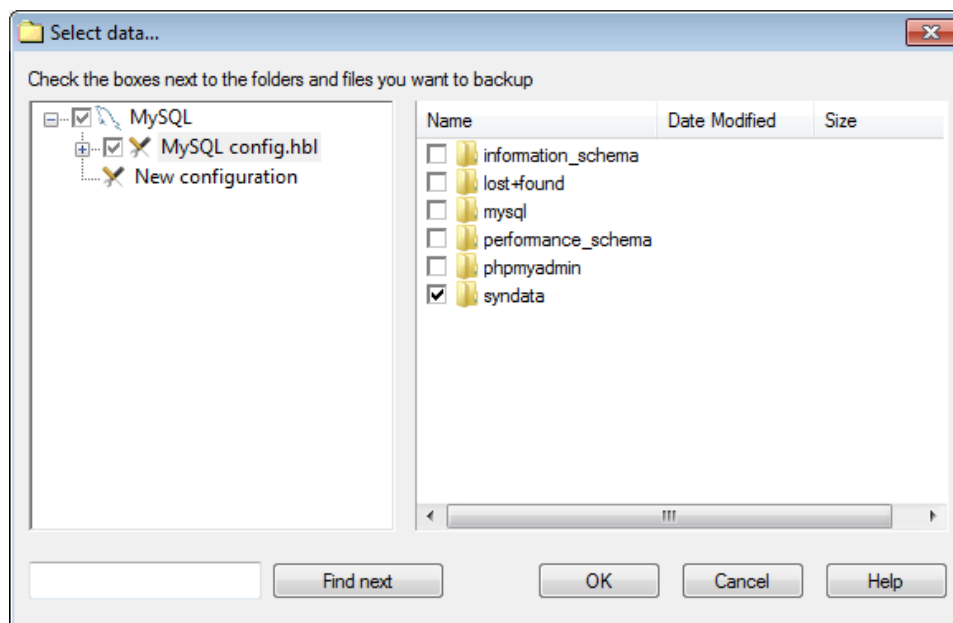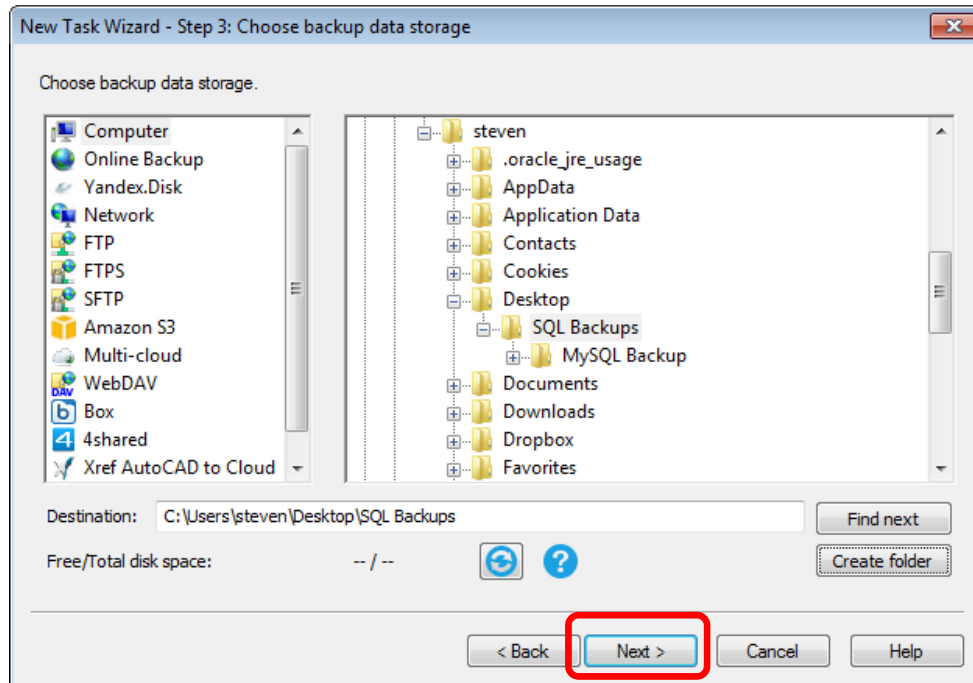
10. Click **Next**.
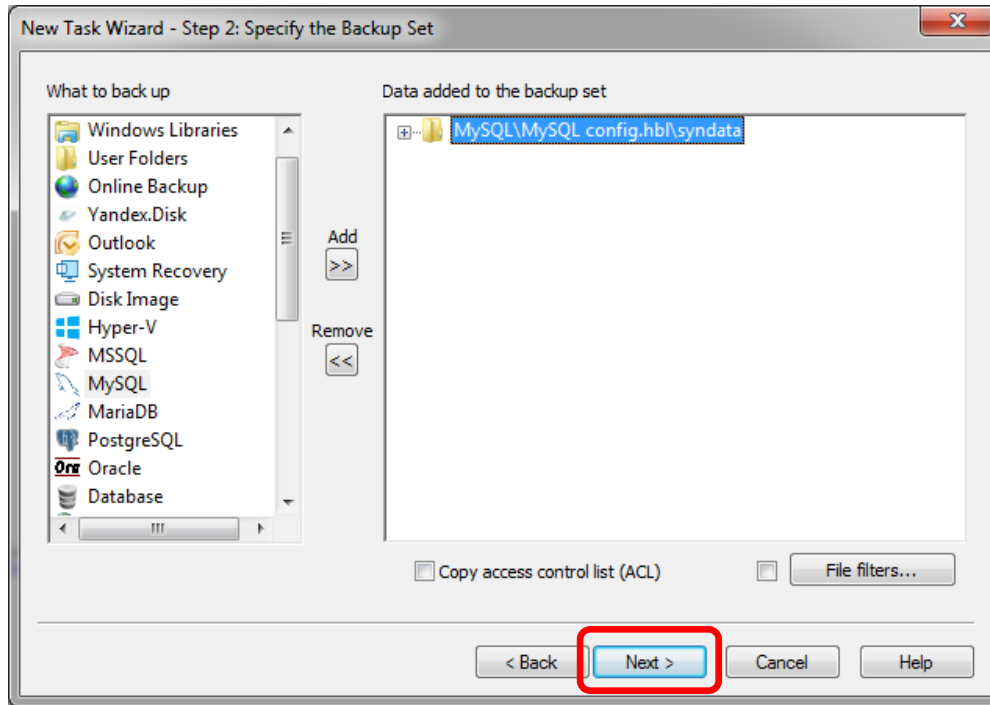
11. Select the destination location for the database backup then click '**Next**'. .
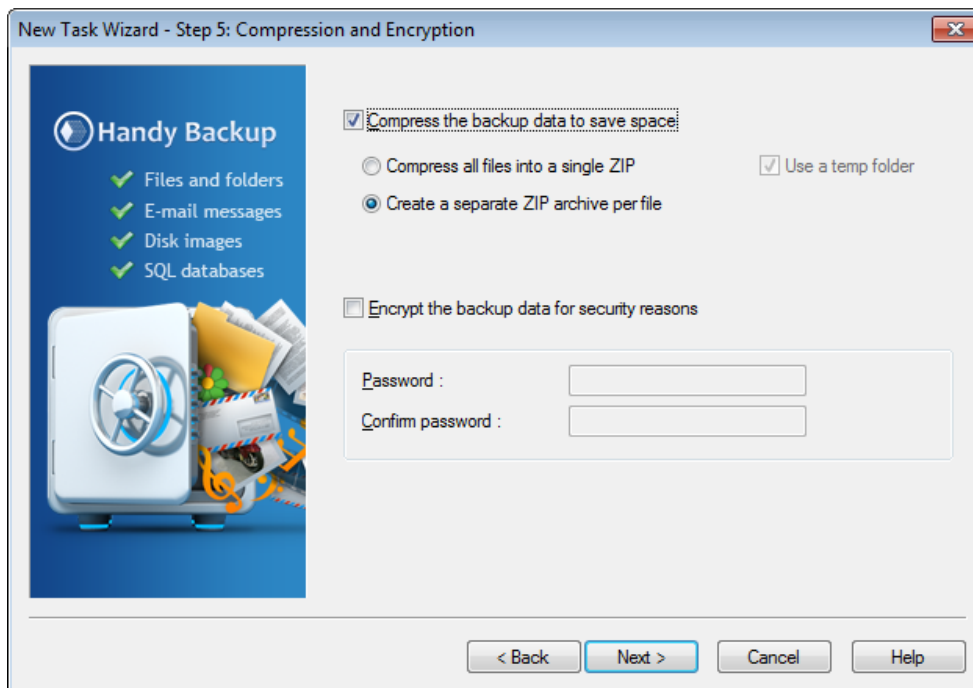   Note: Select a drive location with sufficient capacity to store the database backup. The Synergy Server database can be over 100 GB.
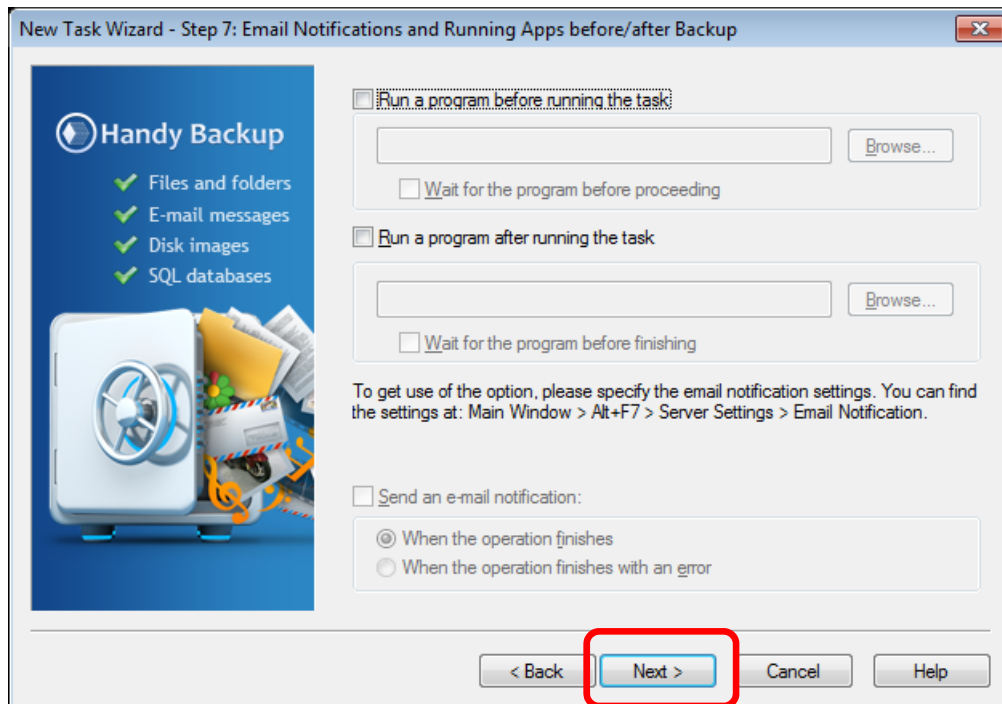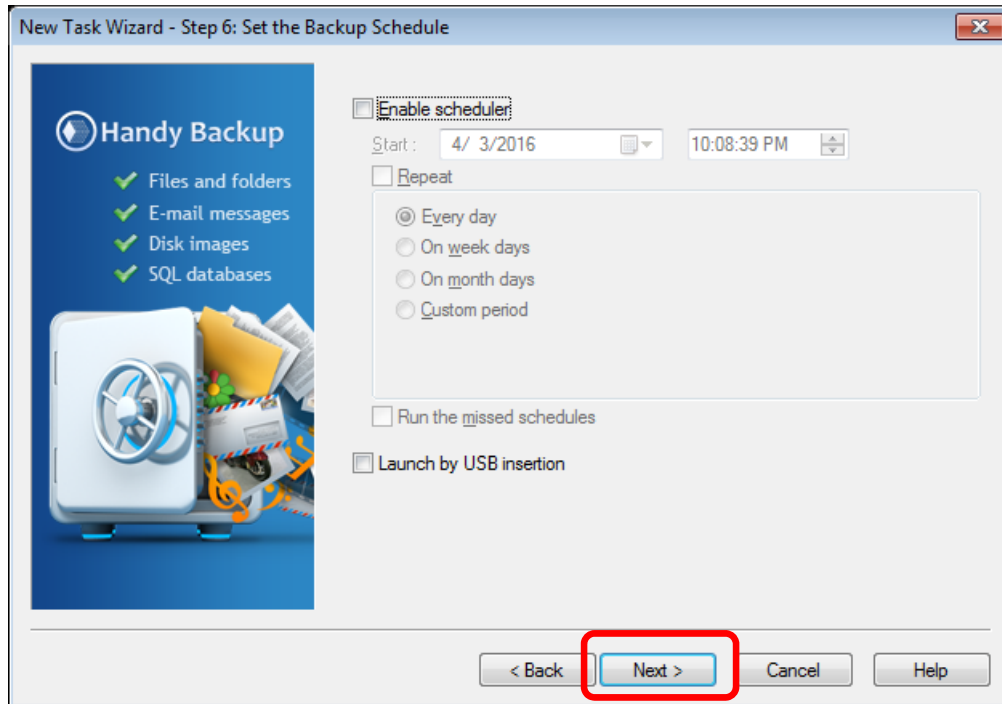
12. Select the **Full** backup type option and Click **Next**.

13. Check the **Compress the backup data to save space** option and select **Create a separate ZIP archive per file** the option. The Synergy Server database is highly compressible.

14. The next several screens offer advanced options. Leave all the options unchecked and click **Next**.

15. The final wizard screen prompts for the name of the backup job. Enter a name for the backup task and select **Execute this task immediately** as required. Click **Next**
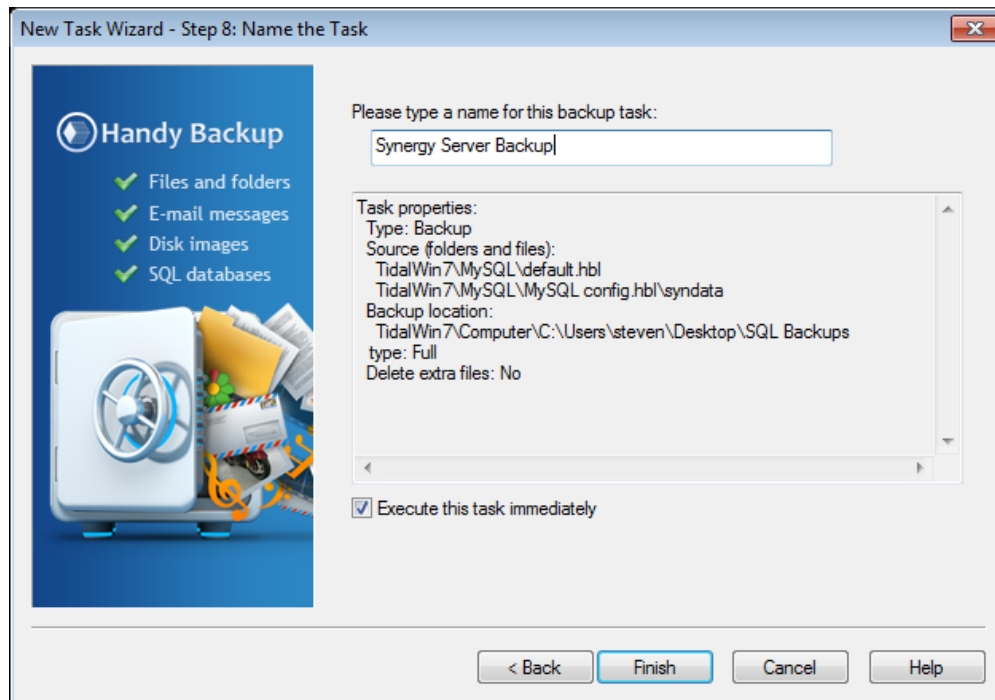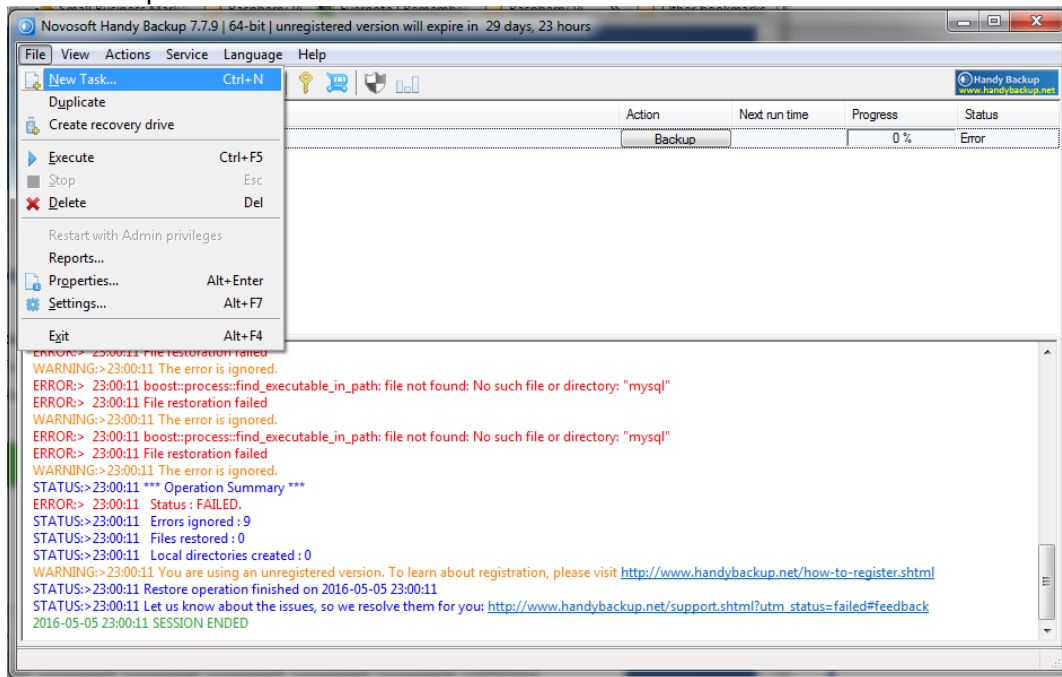

16. If you chose to execute the task upon wizard completion, it will be listed at the top of the task list and report the job status. The progress field will update as the backup processes.
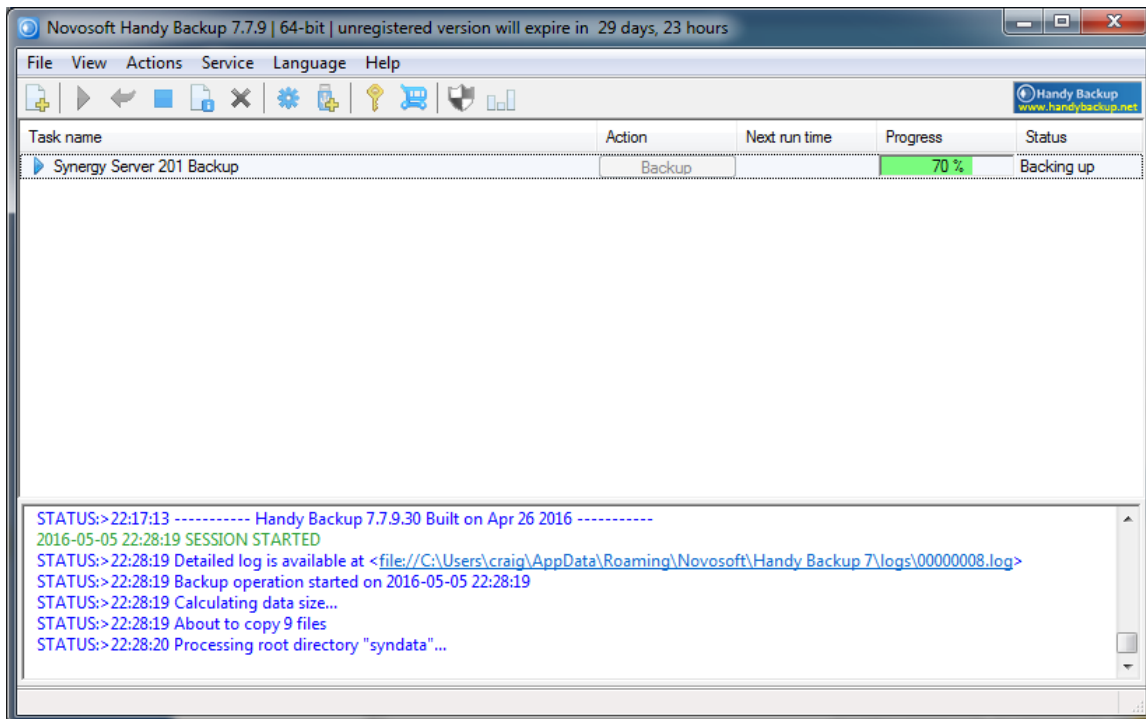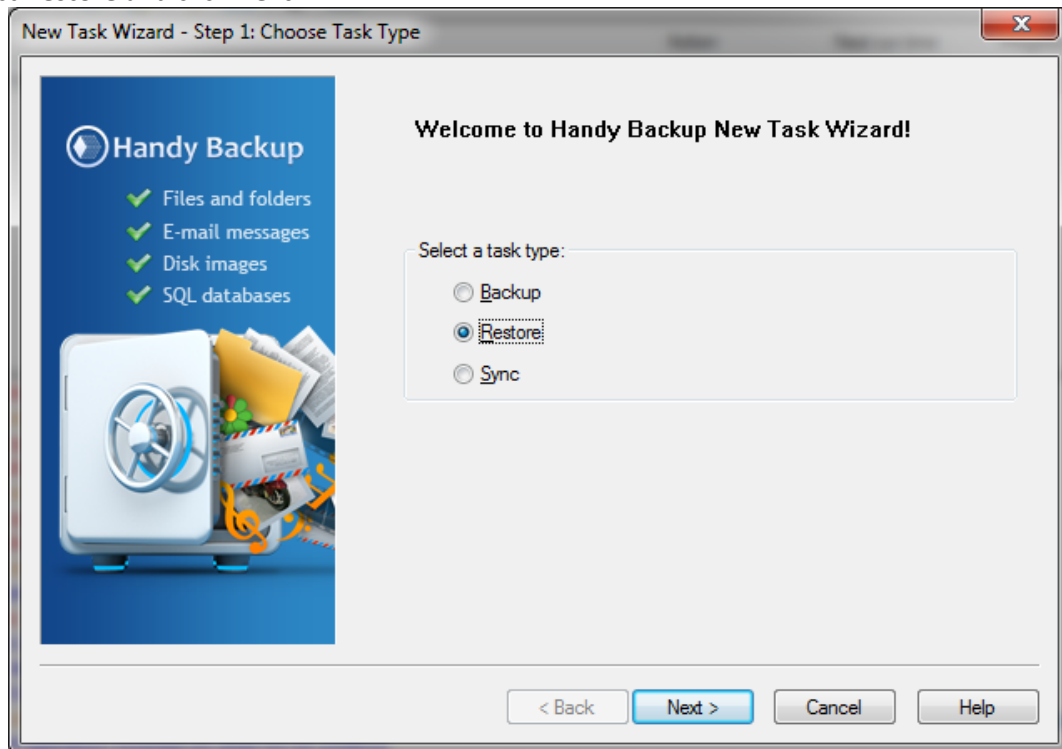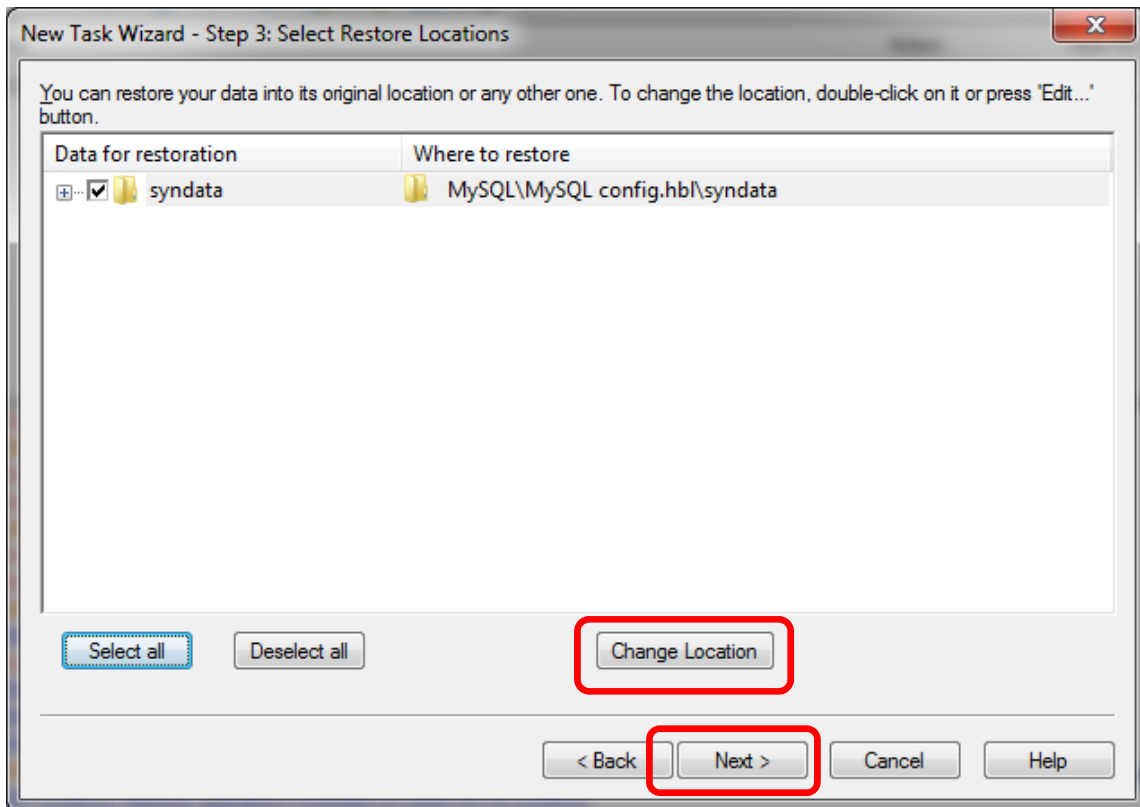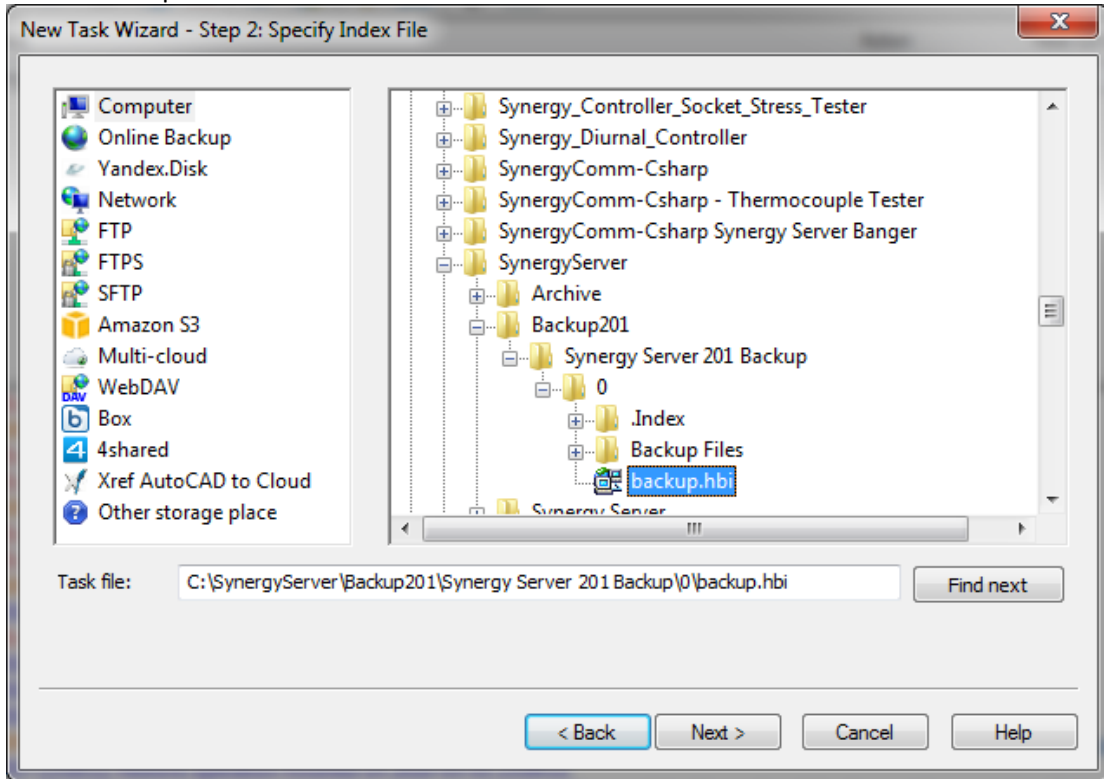
3.5 Database Restore

Select the **New Task** option under the **File** menu.

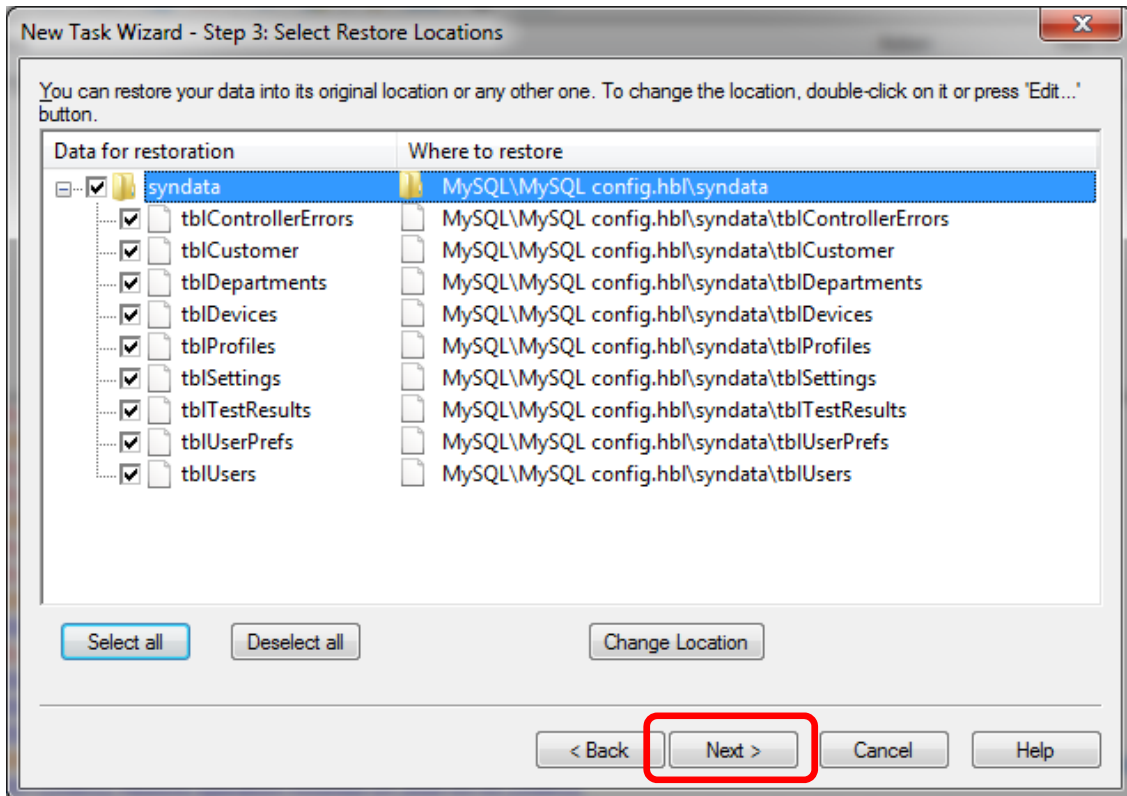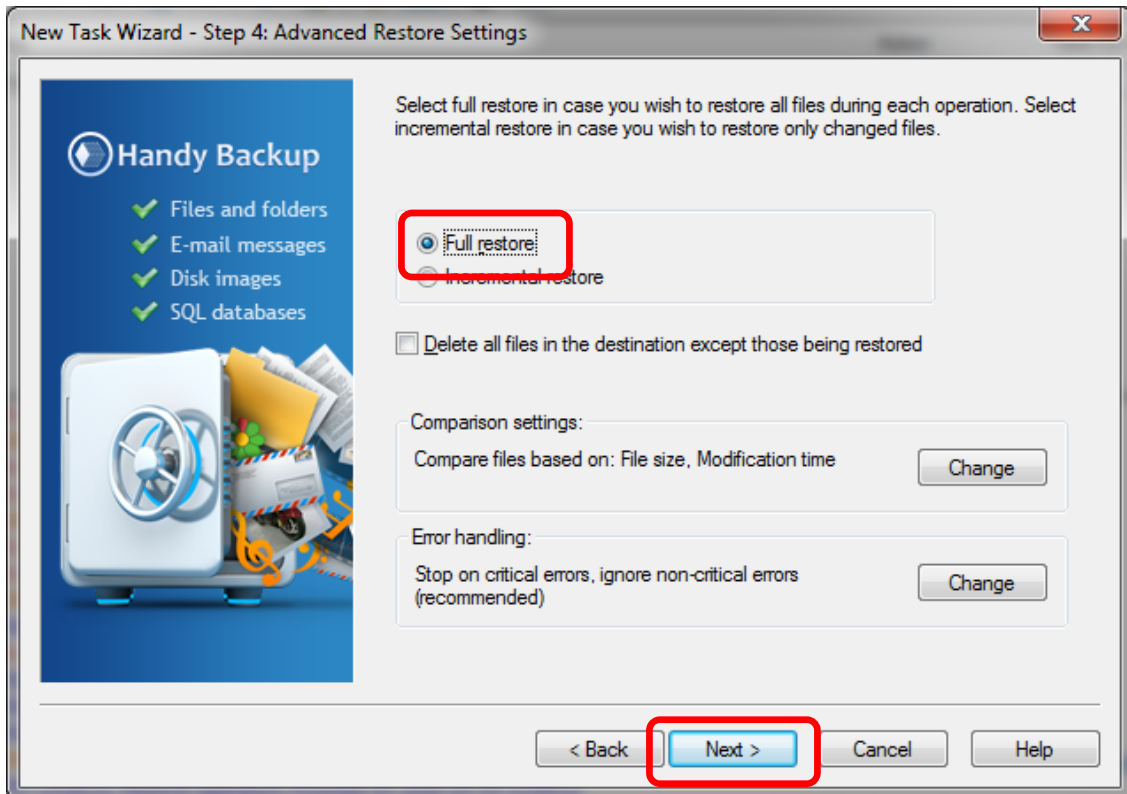
Then select **Restore** and click **Next**.
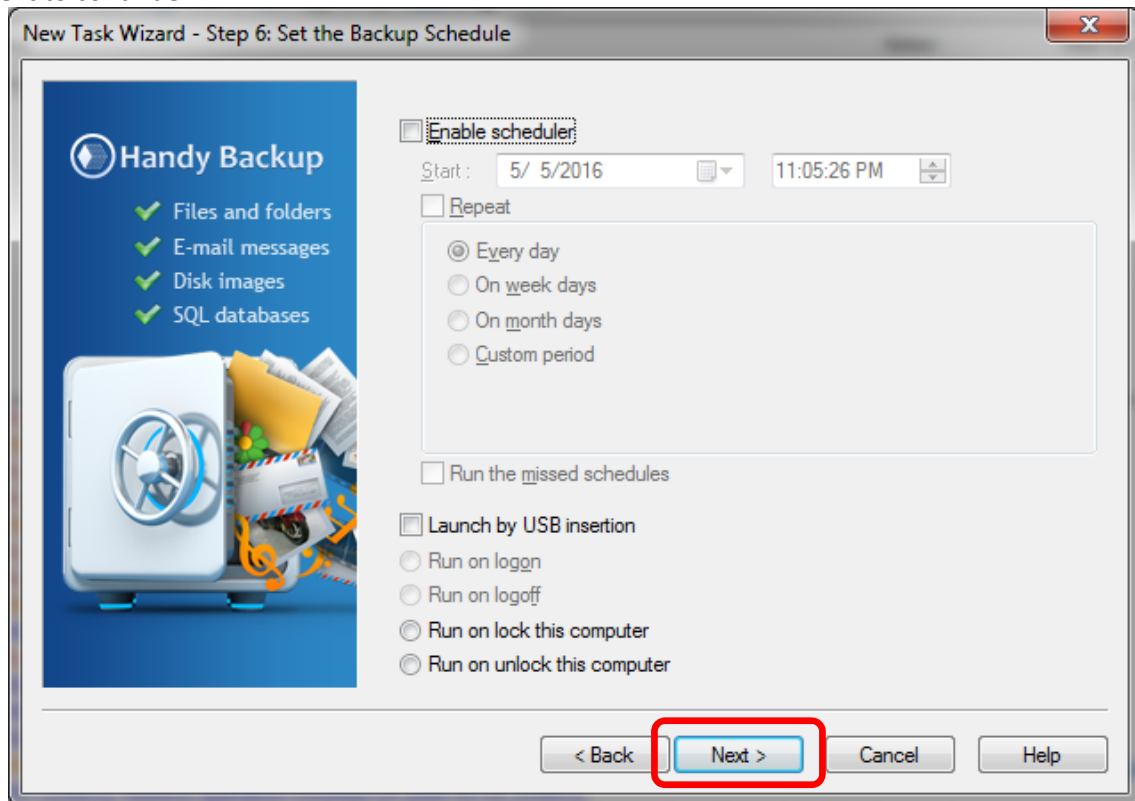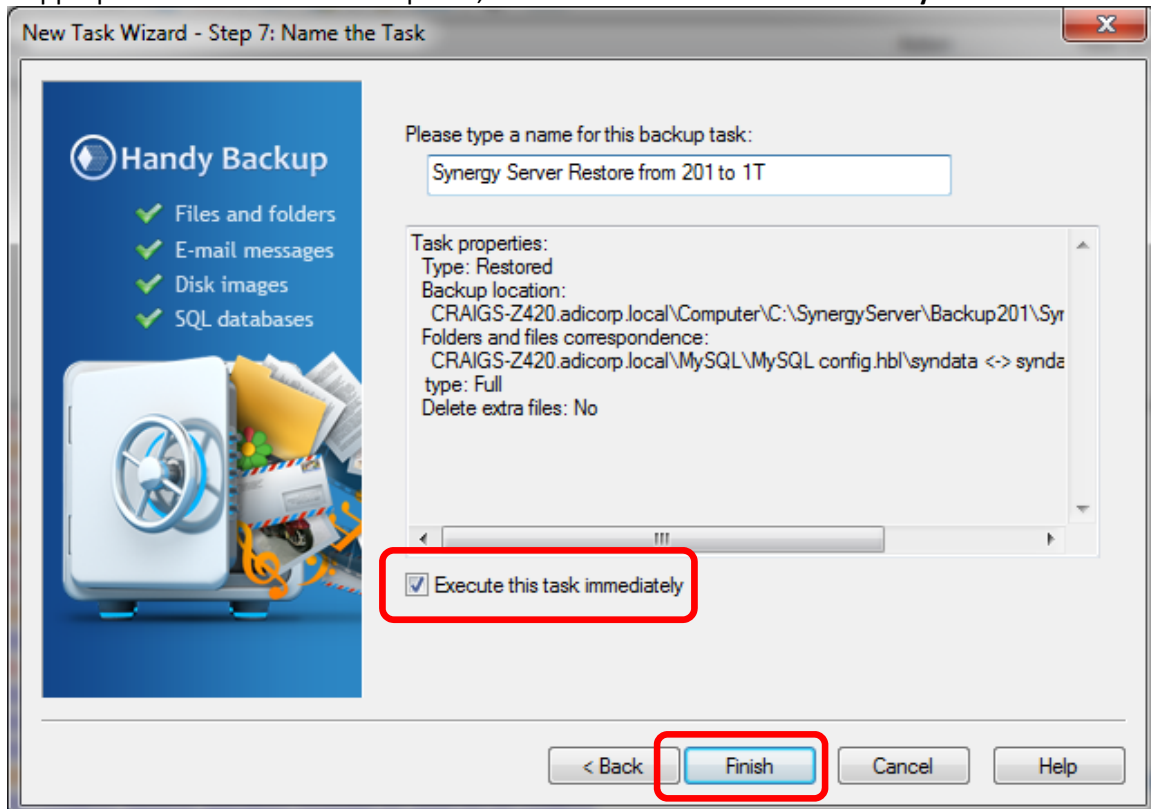
Navigate to the Backup file

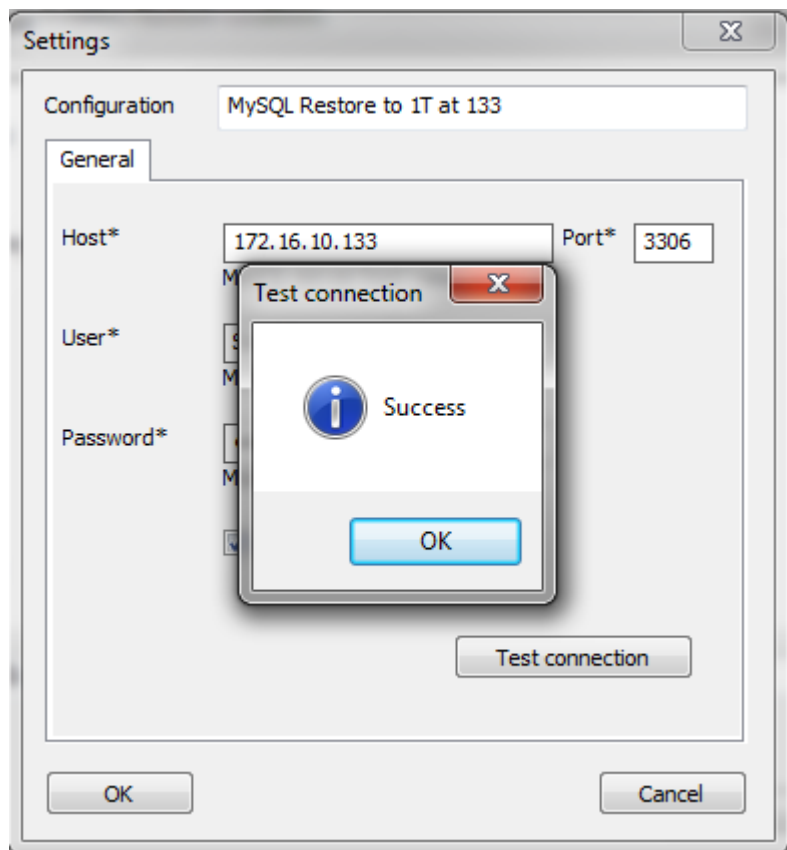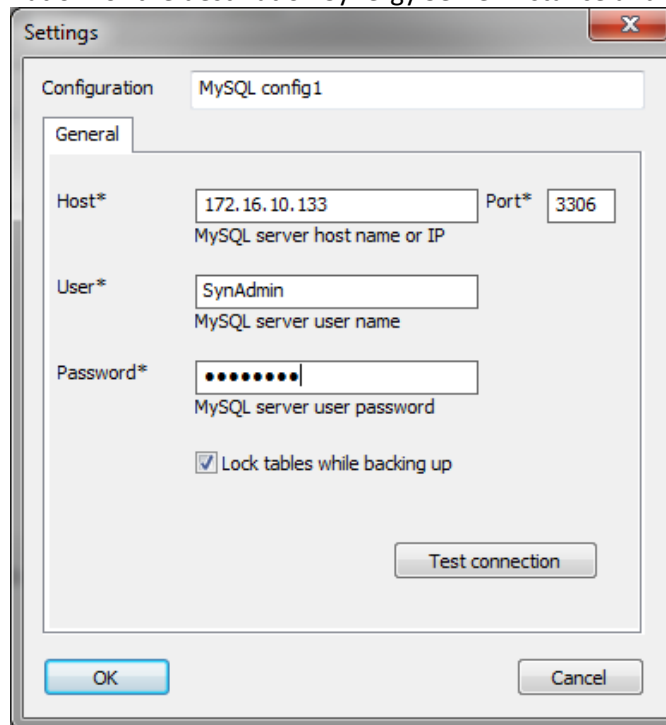Select **Full Restore** and click **Next**

Click **Next** to continue.

Type an appropriate name for the backup task, select **Execute this task immediately** and click **Finish**.

Enter the connection information for the destination Synergy Server instance and click **Test Connection.**

About the Synergy Controller Family

Tidal Engineering's Synergy Controllers, both the Synergy Micro 2, Synergy Quattro, and the ¼ DIN Synergy Nano provide state-of-the-art usability and connectivity for environmental test control and data acquisition and combine the functions of a chamber controller and a data logger. These controllers are designed to improve test efficiency by supporting both factory automation and test and measurement protocols and standards.

Synergy Controller feature highlights includes:
- ➔ Color touch screen
- ➔ Ethernet, RS-232 and GPIB communications
- ➔ Built in 100 MB Data logger with USB drive support
- ➔ Data Acquisition, up to 64 T-type thermocouples (Optional)
- ➔ Built-in Web Server for remote control; WebTouch Remote ™
- ➔ Compatible with Synergy Manager for PC based control, monitoring and programming.
- ➔ Built-in FTP Server for factory automation and test and measurement applications

For more information regarding these controllers please see the full Synergy Controller Technical Manual on our website at http://www.tidaleng.com/synergy.htm

About Tidal Engineering

Headquartered in Randolph, NJ, Tidal Engineering Corporation has been designing and building award-winning embedded hardware and software for test and measurement and data acquisition applications since 1992. The company is recognized for technical expertise in such areas as Embedded IEEE 488, and turnkey SCADA (Supervisory Control and Data Acquisition) systems.

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