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# TACTIC System Administrator

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# Planning

## TACTIC, a Scalable Solution

A data management system to grow along with your expanding data needs

TACTIC software meets the complex content demands of today's large-scale production environment:

- Based on existing web technologies, it is easy to maintain and scale
- Easy to load-balance and scale across cores and across multiple machines

## What Makes TACTIC Scalable?

The TACTIC platform uses web technologies in its underlying architecture. As proven by many popular web sites today, web technologies are able to scale to a large number of users—to levels far beyond the size of any large installation today requiring TACTIC.

The TACTIC user interface and its API (Application Programmer Interface) are both built on web technologies. A web server controls as the user front end., and accesses a back-end database. Web servers can handle high volumes, so scalability is not an issue—especially for the relatively manageable volume seen in even the largest of digital productions.

## Web server technology

TACTIC uses a web server to deliver static content to users, who are able to access TACTIC over the web. Web servers are capable of delivering enormous numbers of requests, and will remain stable during heavy loads. Web servers by definition are the most efficient vehicles for web delivery, and TACTIC technology is optimized to take advantage of this technology for fast execution and scalability.

## Leading database technology

TACTIC stores all persistent data in either Oracle or PostgreSQL databases, products that both have proven track records in the most demanding of production environments.

Today's databases coupled with today's hardware are sufficiently powerful to handle any of today's production needs. The largest of digital productions cannot come close to exceeding the data limits of a typical database.

## Optimized requests

With digital productions, the amount of data required is seldom the issue. Rather, bottlenecks are typically caused by complex requests slowing down database response time. Digital productions tend to use deeply nested and enormously complex relationships between various pieces of data. It is this complexity that tends to slow down applications that try to parse this data in a meaningful human way, creating complex requests that slow down database response.

TACTIC is designed from the ground up to master the complexities of digital productions. For every request, it builds a unique object-relational mapper specifically designed for the needs of high volume, large scale digital production asset management solutions.

TACTIC is flexible enough to handle the complex relationships between any part of the production pipeline, and has proven itself in large-scale projects using extremely complex data.

## Easy code maintenance

The Python programming language is used for TACTIC application development. Python has many strengths that contribute to ease of maintenance (courtesy of [www.python.org](http://www.python.org)):

- clear, readable syntax
- strong introspection capabilities
- intuitive object orientation
- natural expression of procedural code
- full modularity supporting hierarchical packages
- exception-based error handling
- very high-level dynamic data types
- extensive standard libraries and third party modules for virtually every task
- extensions and modules easily written in C, C++ (or Java for Jython, or .NET languages for IronPython)
- embeddable within applications as a scripting interface

## Load balancing

Load balancing—the distribution of requests across TACTIC processes—is possible across cores and across multiple machines, and enables TACTIC to scale to large enterprise environments.

(For details and examples, see **TACTIC Scalable Configuration Examples**.)

## Segregating services

The various TACTIC services can be segregated to run independently of each other. This allows important services, such as user interface requests, to access their own resources and not be slowed down by other more resource-intensive services such as render farms.

(For details and examples, see **Scalable TACTIC Deployments**.)

## Types of Scalability

There are several types of scalability that are considerations with the use of Python as the TACTIC programming language:

- **Code scalability:** TACTIC contains thousands of classes and many hundreds of thousands of lines of code which are facilitated by use of the Python language. There has been no reason to believe that the code base cannot continue to scale to meet software needs for the foreseeable future.
- **Memory scalability:** Python is known for large memory requirements when compared to other languages, but the required memory for TACTIC code is much smaller than that found on typical servers, and has seldom been an issue.
- **Performance scalability:** Python's GIL (Global Interpreter Lock) limits Python's scalability across multiple threads. This limitation has been long discussed in newsgroups, with the general consensus that scalability is achieved much

more easily by load-balancing across processes rather than across threads. TACTIC enables easy load balancing across processes to achieve full linear scalability.

- **Maintenance scalability:** Clean and clear syntax makes it easy to refactor and maintain code over the long term. Experience has shown that our code base is very accessible to new developers, providing confidence that code base knowledge can be maintained over the years.

Overall, very few limitations with the Python language itself have been encountered and have easily circumvented its lack of scalability across multiple threads by optimizing proper load balancing across processes.

## **Additional Scalability Considerations**

### **Availability**

TACTIC has been designed to be highly stable even under extremely heavy stress. It has been tested and tuned on several projects in environments of high stress and high load and has been proven to run under duress without going down.

As with any piece of software, there is always a point a failure—there are a number of legitimate reasons for a TACTIC server becoming unresponsive or even going down:

- network cutoff
- power failure
- physical memory failure
- overloaded requests for the available resources

For projects that require high availability even in the event of catastrophic failure, there are a number of hardware solutions to provide failover should the primary resource fail. These hardware solutions will instantly redirect requests to a redundant resource, thereby providing continuous service to the users.

### **Memory requirements**

Each available process will use a certain amount of memory, so a balance must be struck between the number of processes and the size of the complete in-memory TACTIC footprint on the server. In other words, adding more processes may or may not increase the availability of TACTIC if memory is an issue. If processes start running into swap space, performance will be severely affected.

As memory usage becomes an issue, the choice will be to load balance over multiple machines (see **Scalable TACTIC Deployments**).

### **Database Replication**

Both Oracle and Postgres have replication capability: the ability to distribute the processing load of the database server over a number of machines. Database replication is complex and should not be taken lightly. With the advent of multiprocessor and multi-cores systems, the need for database replication has been reduced significantly. It is often much cheaper and less time consuming to increase the processors/cores of a server than it is to configure a database for replication.

# Install TACTIC Application

## General TACTIC Install

This document guides you through the general installation of TACTIC in Fedora Linux with some brief background information. For installation on Windows or CentOS, please refer to the corresponding sections in this book. To completely install TACTIC, there are three main components that have to be set up in the following order:

1. A Database
2. The TACTIC Installer
3. A Web Server

## Install the Database

TACTIC stores all metadata in a database called PostgreSQL. This is an industrial strength, hugely scalable database that has proven itself in thousands of industries around the world. We currently recommend 8.4 and upwards for ease of installation. Go to the PostgreSQL website for more information.

1. `rpm -Uvh http://yum.pgrpms.org/reporpms/8.4/pgdg-fedora-8.4-2.noarch.rpm`
2. `yum install postgresql postgresql-server postgresql-contrib postgresql-devel`
3. It is located in `/var/lib/pgsql/data` This file determines all of the user permissions for PostgreSQL. To begin with, turn on all of the permissions contained in this file. This is a temporary measure that will greatly simplify the installation process. You may lock down these permissions at a later date. Please consult the PostgreSQL documentation on how to do this. TACTIC ships with a sample "pg\_hba.conf" file (located in `<TACTIC_unzipped_package>/src/install/postgresql/pg_hba.conf`). This file has an open security setting for ease of installation. It's best to back up your current `pg_hba.conf` file before copying over with the file provided by TACTIC.
4. Restart the PostgreSQL Service

### Verification

Verify that `psql` works in the command prompt:

```
> psql -U postgres template1
```

It should give you a prompt:

```
template1=#
```

If you see this prompt without the need to enter a password, you have successfully installed the PostgreSQL database. Type `\q` to exit.

## Install TACTIC

### 1. Install Python and supporting modules

The TACTIC source code is written in Python. As such, the complete codebase is open.

To install Python, you can find an msi at <http://www.python.org>. TACTIC requires Python 2.6 or higher.

TACTIC also requires a number of Python modules to function correctly. These modules are generally not installed by default with the standard Python distributions. For Windows, they are already packaged in a file `python_modules.zip` available for download in the release section of the downloads page at <http://support.southpawtech.com/downloads>

- **PIL 1.1.7** (Python Image Library)
- **ImageMagick 6.7.8** (A command line program which complements PIL) - <http://www.imagemagick.org>
- **FFmpeg version 0.6**(Solution to record, convert and stream audio and video and metadata parsing) - <http://www.ffmpeg.org>
- **psycopg2 2.3.1** (Database connectivity)
- **PyCrypto version 2.0.1/2.1** (For de-encrypting the license file) - <http://www.amk.ca/python/code/crypto>
- **simplejson 2.1.1 (not needed since Python 2.6)** simplejson.egg can be installed with the EasyInstaller. It is need for JSON string encoding and parsing
- **lxml 2.1 or 2.2** (XML and XPath processing)

### 2. Unzip the file in a temporary location.

```
# cd /tmp
# unzip tactic_#.#.#.#.zip
```

### 3. Go to `/tmp/tactic_#.#.#.#/src/install/`

```
# cd /tmp/tactic_#.#.#.#/src/install
```

### 4. Execute: `install.py`



#### Note

You must invoke the installation with root user privileges because it attempts to write to the `<python_install>/site-packages` directory.

```
# su
# python install.py
```

The installer will ask a number of questions. First it ask for the `<TACTIC_BASE_DIR>`:

```
Please enter the base path of the TACTIC installation:
(/home/apache) ->
```

Enter the user the Apache Web Server is run under.

```
Please enter the user Apache Web Server is run under:
(apache) ->
```

It would copy the source code to the base path and create a symbolic link to it. An Apache Web Server file will be generated at the end which you would need to copy to the Apache config area upon installation of the web server. If there are existing files in the destination directory the installer will ask for your confirmation to remove it. At the end, you will see this:

```
*** Installation of TACTIC completed at [/home/apache] ***

Next, please install the Apache Web Server and then copy the Apache config extension
[/home/apache/tactic_data/config/tactic.conf] to the Apache web server config area. e.g.
/etc/httpd/conf.d/
```

## Verification

When the installation is completed, an asset directory will be created at '<TACTIC\_DATA\_DIR>/assets'.

The file `tactic_paths.py` will be created in the following directories:

Linux	<code>/usr/lib/python#.#/site-packages/tacticenv</code>
-------	---------------------------------------------------------

Default contents:

```
TACTIC_INSTALL_DIR=' /home/apache/tactic'
TACTIC_SITE_DIR=' '
TACTIC_DATA_DIR=' /home/apache/tactic_data'
```

## Network machine access

If you are on the server, you can access it by using the URL `http://localhost/tactic`. For other people to access it on the network, you need to find out its IP address. In a linux server, you can use the command "ifconfig" to locate it. It's the one listed as the inet addr.

Next, you need to run TACTIC behind Apache.

## Install the Web Server

TACTIC should be run behind an Apache web server. You can download Apache software at <http://www.apache.org/>

The TACTIC application server is able to serve up static content such as images, PDF files, Quicktime files, and so on, but it is not the most efficient at this because it is written in Python. This is what Apache is designed for. By running TACTIC behind Apache, it relieves TACTIC from serving the static content so that it can focus on the dynamic content.

For production use, it is highly recommended that TACTIC is run behind the Apache server. This has many scalability advantages. When running behind Apache, Apache uses a reverse proxy and proxy balancer module to forward requests to communicate with TACTIC.

## Linux

After the installation, some changes may need to be made in the "httpd.conf" file for Apache.

```
Fedora Core: /etc/httpd/conf/httpd.conf
```

Make sure the following lines are uncommented:

```
LoadModule rewrite_module modules/mod_rewrite.so
LoadModule proxy_module modules/mod_proxy.so
```

```
LoadModule proxy_http_module modules/mod_proxy_http.so
LoadModule proxy_balancer_module modules/mod_proxy_balancer.so
LoadModule deflate_module modules/mod_deflate.so
```

These lines may already be uncommented, depending on your distribution and version of Apache. You need Apache version 2.0.31 or later.

The TACTIC installer generates an Apache extension conf file on completion. Copy that file to a directory that is recognized by Apache.

For Fedora Core: copy the TACTIC generate Apache conf extension file to the following directory:

```
/etc/httpd/conf.d/
```

If there is no such configuration extension folder, you must add the following line to the "httpd.conf" file so that it will read the extension configuration file provided by the installer:

```
Include conf/tactic_win32.conf
```

## Web Server configuration

In our provided file:

```
tactic.conf
```

Make sure the following lines exist:

```
# Using the ProxyPass directives
ProxyPreserveHost on

<Proxy balancer://tactic>
BalancerMember http://localhost:8081/tactic
BalancerMember http://localhost:8082/tactic
BalancerMember http://localhost:8083/tactic
</Proxy>
ProxyPass /tactic balancer://tactic
ProxyPass /tactic_data balancer://tactic
```



### Note

Warning: For load balancing, only use either:

1) the Proxy Balancer method (recommended)

**or**

2) the RewriteRule method (not recommended).

Do **not** use both methods at the same time.



### Note

For configuring load-balancing set-up in a real production, please refer to the Load Balancing section in the Sys-admin docs.



### Note

When trying to set up Apache on a Windows Server, to specify a share folder for Apache to use, you may need to include the name of the share folder in the path.



For example, use the following if you have named the share folder "my\_share":

```
Alias /assets "//10.0.0.17/my_share/assets"
```

Finally, after verifying the configuration is correct, restart the Apache service:

```
service httpd restart
```

## Run TACTIC in development mode

Go to the "<TACTIC\_INSTALL\_DIR>/src/bin" folder

```
cd /home/apache/tactic/src/bin
```

Then su as the user apache is run as:

```
su apache
```

```
python startup_dev.py
```

This "startup\_dev.py" script is the development script which will dump output to the screen. The other startup script "startup.py" is the production start-up script and will dump output to a log file. The development start-up script is also much slower as it monitors the file system to see if any files have changed.

The output would look like the following:

```
Registering site ... admin
Registering site ... default
Registering site ... test
Registering site ... my_project

Starting TACTIC ...

05/Jul/2007:11:16:29 CONFIG INFO Server parameters:
05/Jul/2007:11:16:29 CONFIG INFO server.environment: development
05/Jul/2007:11:16:29 CONFIG INFO server.log_to_screen: True
05/Jul/2007:11:16:29 CONFIG INFO server.log_file: D:/tactic_temp/log/tactic_log
05/Jul/2007:11:16:29 CONFIG INFO server.log_tracebacks: True
05/Jul/2007:11:16:29 CONFIG INFO server.log_request_headers: True
05/Jul/2007:11:16:29 CONFIG INFO server.protocol_version: HTTP/1.0
05/Jul/2007:11:16:29 CONFIG INFO server.socket_host:
05/Jul/2007:11:16:29 CONFIG INFO server.socket_port: 8081
05/Jul/2007:11:16:29 CONFIG INFO server.socket_file:
05/Jul/2007:11:16:29 CONFIG INFO server.reverse_dns: False
05/Jul/2007:11:16:29 CONFIG INFO server.socket_queue_size: 10
05/Jul/2007:11:16:29 CONFIG INFO server.thread_pool: 5
05/Jul/2007:11:16:30 HTTP INFO Serving HTTP on http://localhost:8081/
```

[http://<TACTIC\\_server\\_address>/tactic/admin/](http://<TACTIC_server_address>/tactic/admin/)

You should see the TACTIC login appear.



There is a default user created on installation. This is the "admin" user and this user has the ability to see and change all aspects of the system. Log in as the admin user:

**user:**                      **admin**  
**password:**                **tactic**

## Run TACTIC in service mode

Note: If you have not set up the TACTIC service, refer to the page "Configure the TACTIC Service".

First, stop TACTIC running in dev mode if applicable by pressing Ctrl + C in that shell

In Linux:

**service tactic start**

At this point you will need to install a TACTIC license file and then begin to set up a project.

- For more information on installing the license file, please refer to the **License Installation Documentation**.
- For more information on getting started with projects, please refer to the **Sys Admin Project Guides**.

### Note on supplementary directories used in TACTIC:

In the config file <TACTIC\_DATA\_DIR>/config/tactic-conf.xml, you will find different references to directory under the path /home/apache like /home/apache/tactic\_temp , assets, and handoff. They are there because /home/apache is the base directory chosen for installation. It could be different in your case. In the future, you can change their locations by editing the config file. If the assets directory is changed, ensure it's also updated in the Apache Web server config extension tactic.conf.

## System Info Page

To view different information about the system and set-up, you can go to the Site Admin --> System Info page. For example, you can verify if load-balancing is set up and certain key directories are writable by TACTIC.

## Troubleshooting

- If you see missing images on logging in or errors in the output log saying certain js files are not found, it means the Apache extension file `tactic.conf` is not being referenced or you have not updated the paths in it to reflect current `<TACTIC_INSTALL_DIR>`. For example, if your `<TACTIC_INSTALL_DIR>` is `/home/apache/tactic`, you should see the line in the Apache config extension file `tactic.conf`:

```
Alias /context /home/apache/tactic/src/context
```



### Note

Be aware of the slight differences in the naming of the configuration files:

**tactic-conf.xml**: TACTIC configuration file

**tactic.conf**: Apache configuration file extension

- If you try to check in a Preview Image and can't see the icon generated, your assets alias in the Apache extension file may not be in sync with the `asset_base_dir` in the TACTIC config file `tactic-conf.xml`

```
Alias /assets /home/apache/assets
```

should point to the `asset_base_dir` as found in `tactic-conf.xml`

```
<asset_base_dir>/home/apache/assets</asset_base_dir>
```

- If you want to re-run `install.py`, the installation will ask if you to confirm backing up the `sthpw` database before dropping it. If you choose to do it yourself, here is the command:

```
pg_dump -c -U postgres sthpw > sthpw_backup.sql
dropdb -U postgres sthpw
```

- If you try to connect to the `http://<server IP>/tactic` and it just times out, your server firewall could be blocking access. Ensure SELinux is not enabled as well.

```
# to turn off firewall
/etc/init.d/iptables save
/etc/init.d/iptables stop
```

## TACTIC Install - CentOS 5.5

Below are the step-by-step instructions of how to install TACTIC on CentOS 5.5. For CentOS 6.2 and above, please refer to the TACTIC Install - CentOS 6.2 page.

### CentOS 5.5

Unfortunately, CentOS 5.5 comes pre-packaged with an outdated version of Python: Python 2.4. TACTIC requires Python 2.7.

To get around this, when we install Python 2.7, we do not overwrite the original Python 2.4. See steps #8 and #9.

Overwriting the original Python would break some software packages, such as Yum.

We must remember to call Python2.7 explicitly whenever we run any TACTIC python scripts, including startup.py

1. Log in as the root user.

2. Open the passwd file.

```
vi /etc/passwd
```

Modify the apache home directory and login shell to look like the following:

```
apache:x:48:48:Apache:/home/apache:/bin/bash
```

3. Set password for apache to: south123paw

```
passwd apache
```

4. Open to the sudoers file.

```
visudo
```

Add the apache user by including the following line in the appropriate location in the file:

```
apache ALL=(ALL) ALL
```

5. Create the home directory for apache.

```
mkdir /home/apache  
chown apache:apache /home/apache  
chmod a+rx /home/apache
```

6. Disable SELinux by setting SELINUX=disabled

```
vi /etc/selinux/config
```

7. Remove the existing Postgres and Install Postgres 8.4 modules.

```
yum remove postgresql postgresql-libs postgresql-server  
  
vi /etc/yum.repos.d/CentOS-Base.repo  
Add the exclude line to the 2 section base and updates:  
  
[base]  
exclude=postgresql*  
[updates]  
exclude=postgresql*  
  
rpm -Uvh http://yum.pgrpms.org/reporpms/8.4/pgdg-centos-8.4-2.noarch.rpm
```

```
yum install -y postgresql postgresql-server postgresql-contrib
yum install -y postgresql-devel
yum install -y gcc zlib-devel samba libxslt-devel libxml2-devel
```

#### 8. Install Python 2.7.

```
cd; wget http://www.python.org/ftp/python/2.7.1/Python-2.7.1.tgz
tar zxvf Python-2.7.1.tgz
cd Python-2.7.1
./configure --with-zlib=/usr/include
make install
```

9. Installing Python 2.7 will install python2.7 command "ahead" of the original python so that "python" from the command line is now 2.7. This will potentially break yum or other OS admin tools. To fix this, remove the python executable for 2.7.

```
rm /usr/local/bin/python
```

10. Restart the shell so that the environment is clean.

#### 11. Install lxml.

```
cd; wget http://codespeak.net/lxml/lxml-2.2.8.tgz
tar zxvf lxml-2.2.8.tgz
cd lxml-2.2.8
python2.7 setup.py install
```

#### 12. Install PIL.

```
cd; wget http://effbot.org/downloads/Imaging-1.1.7.tar.gz
tar zxvf Imaging-1.1.7.tar.gz
cd Imaging-1.1.7
python2.7 setup.py install
```

#### 13. Install pycopg2.

```
cd; wget http://pypi.python.org/packages/source/p/psycopg2/psycopg2-2.3.2.tar.gz
http://initd.org/psycopg/tarballs/PSYCOPG-2-3/psycopg2-2.3.1.tar.gz
tar zxvf psycopg2-2.3.2.tar.gz
cd psycopg2-2.3.2
python2.7 setup.py install
```

#### 14. Install PyCrypto.

```
cd; wget http://pypi.python.org/packages/source/p/pycrypto/pycrypto-2.3.tar.gz
tar zxvf pycrypto-2.3.tar.gz
cd pycrypto-2.3
python2.7 setup.py install
```

#### 15. Disable firewall.

```
/etc/init.d/iptables save
/etc/init.d/iptables stop
```

#### 16. Create and open the index.html for redirection.

```
vi /var/www/html/index.html
```

Insert the following contents:

```
<META http-equiv="refresh" content="0;URL=/tactic">
```

#### 17. Re-login as the apache user.

#### 18. Download the TACTIC source code

Open the following link in a web browser and download the latest TACTIC Enterprise release.

```
http://community.southpawtech.com/downloads
```

Set up the TACTIC service.

```
cd /tmp
unzip tactic_#.#.#.#.zip

sudo cp /tmp/tactic_#.#.#.#/src/install/service/tactic/etc/init.d
sudo chmod 775 /etc/init.d/tactic
sudo /sbin/chkconfig tactic on
```

19.Set up Postgres.

```
sudo service postgresql initdb
sudo /etc/init.d/postgresql start

sudo mv /var/lib/pgsql/data/pg_hba.conf /var/lib/pgsql/data/pg_hba.conf.bak
sudo cp /tmp/tactic_#.#.#.#/src/install/postgresql/pg_hba.conf /var/lib/pgsql/data
sudo chown postgres:postgres /var/lib/pgsql/data/pg_hba.conf
sudo /sbin/chkconfig postgresql on
sudo /etc/init.d/postgresql restart
```

20.Install TACTIC. You will be asked to enter a base directory for installation. We call this <TACTIC\_BASE\_DIR>

```
cd /tmp/tactic_#.#.#.#/src/install
sudo python2.7 install.py
sudo /sbin/chkconfig tactic on
```

21.Set up Apache. Copy the tactic.conf generated by the TACTIC Installer.

```
sudo cp <TACTIC_BASE_DIR>/tactic_data/config/tactic.conf /etc/httpd/conf.d/
sudo /sbin/chkconfig httpd on
sudo /etc/init.d/httpd start
```

22.Startup TACTIC in dev mode.

```
python2.7 /home/apache/tactic/src/bin/startup_dev.py
```

23.Try accessing TACTIC through a web browser on a client machine. <http://<server IP>/tactic>

24.Once startup\_dev works, Ctrl^C out of the process.

```
Ctrl^C
```

25.Open the TACTIC service file for edit.

```
sudo vi /etc/init.d/tactic
```

Modify the variable for PYTHON as follows:

```
PYTHON=/usr/local/bin/python2.7
```

26.Open the TACTIC configuration file for edit.

```
vi <TACTIC_BASE_DIR>/tactic_data/config/tactic_linux-conf.xml
```

Modify the option variable for python as follows:

```
<python>/usr/local/bin/python2.7</python>
```

27.Start TACTIC as a service and install the license in a Java-enabled browser.

```
sudo /etc/init.d/tactic start
```

28.To view different information about the system and set-up, you can go to the Site Admin --> System Info page.  
For example, you can verify if load-balancing is set up and certain key directories are writable by TACTIC.

End of installation instructions.

## TACTIC Install - CentOS 5.7

CentOS 5.5 has now been deprecated in favour of CentOS 5.7 or CentOS 6.0. Since CentOS 5.5 will no longer receive updates and we urge you to consider using a more up to date version of the operating system such as CentOS 5.7.

For CentOS 6.2 and above, please refer to the TACTIC Install - CentOS 6.2 page. Step-by-step instructions for Tactic 3.6.0.v01 are provided below.

## Requirements

Tactic requires the following software to be installed:

- Apache HTTP server 2.2
- Postgres Database Server 8.4 or higher
- Python 2.7 and the following Python modules:
  - Python Imaging Library 1.1.7
  - Python lxml 2.2.8
  - Pycrypto 2.3
  - Psycopg2 2.3.2

It should be noted that while there may be newer versions of these Python modules, Tactic 3.6.0.v01 is built with these particular versions and may not work as intended should you use later versions.

## Disabling Security for Testing

For the sake of getting Tactic up quickly without a large amount of fuss, it is prudent to disable firewalling and SELinux. This is by no means an endorsement to run your server without these services. Once you have Tactic up and running we encourage you to read the section <TACTIC SECURITY>.

CentOS 5.7 uses the iptables service as a firewall. To disable this temporarily you can issue the following commands as root.

```
/etc/init.d/iptables save  
/etc/init.d/iptables stop
```

This will disable the firewall for the currently running CentOS session. Should you wish these settings to persist across reboots. You can issue the following command as root.

```
/sbin/chkconfig iptables off
```

To disable SELinux, edit the file /etc/selinux/config as root with your favourite editor and set the SELINUX variable to 'disabled'.

```
SELINUX=disabled
```

Getting this setting to take effect requires a reboot.

## Installing Apache HTTP server

To install Apache 2.2 on CentOS 5.7 issue the following command as root:



```
yum install httpd
```

This package has several dependencies and they should be installed as well.

It would be good to familiarize yourself with some of the more pertinent paths in the Apache installation on CentOS5.7. We've listed them below for your convenience.

### Apache 2.2 paths

Path  
~~etc/~~  
~~httpd/~~  
~~conf~~  
~~httpd.conf~~  
configuration  
file.

Path  
~~etc/~~  
~~httpd/~~  
~~conf~~  
dynamic  
configuration  
directory.

Path  
~~var/~~  
~~log~~  
~~httpd~~  
~~error.log~~  
log.

Path  
~~var/~~  
~~www/~~  
~~html~~  
Document  
Root  
folder  
of  
the  
base  
Apache  
install.

It's best to test your Apache install at this point. The included main Apache configuration file is enough to get the server started. You will need create a small html file to do this. Using your favourite editor create a file called index.html, including the following contents:

```
<html>
  <head>
    <title>Apache Base Install</title>
  </head>
  <body>
    <p>Apache Install Successful</p>
  </body>
</html>
```

Save the file in /var/www/html and issue the following command as root to ensure proper permissions are set.

```
chmod 755 /var/www/html/index.html
```

Now we can start the Apache server itself. As root issue the following command.

```
/etc/init.d/httpd start
```

The service should start successfully. If it does not consult the Apache error log listed above to discover any problems that may have occurred.

At last we should now be able to point a web browser to the IP address associated with the server. If you see the text "Apache Install Successful", then your server is up and running and server pages properly.

Finally we will want the Apache service to persist through reboots. As root issue the following command:

```
/sbin/chkconfig httpd on
```

Then reboot the server and make sure that httpd comes up on reboot and that you can view the test page properly. Later in the install we will configure the Apache server to interact with Tactic properly.

## Installing Postgres Database Server

CentOS 5.7 repositories use Postgres version 8.1.23-1. However Tactic requires version 8.4 or higher. First we must make sure that we didn't include the default version Postgres in our base install. As root please issue the following command:

```
rpm -qva | grep -i postgres
```

This command will search your installed packages and filter the output for any packages containing the word postgres. If you receive any output from this command please uninstall the packages by issuing the following command:

```
rpm -e <package_name>
```

Where <package\_name> is the name of the package you wish to uninstall. Consult the RPM or Yum manpages for further instructions on installing and uninstalling packages.

Lastly before installing any new Postgres repository, we want to make sure to exclude the default version of Postgres from showing up in the base and update Yum repositories included with the operating system itself. Using your favourite editor, edit the file /etc/yum.repos.d/CentOS-Base.repo to include the line:

```
exclude=postgresql*
```

Under both the [base] section and the [updates] section of the file. Save the file. For more information on the Yum installer and repository system please see the manpages for yum or the yum website <http://yum.baseurl.com>

Once we have uninstalled any previous versions of Postgres, we can then proceed installing a new Yum repository that contains the version of Postgres we want to install. As root issue the following commands:

```
cd /tmp
wget http://yum.pgrpms.org/9.1/redhat/rhel-5-i386/pgdg-centos-91-9.1-4.noarch.rpm
rpm -Uvh pgdg-centos-91-9.1-4.noarch.rpm
```

At the time of writing the current version of Postgres was 9.1-4, for more current installation versions please visit <http://yum.pgrpms.org/repopackages.php> and view the available repository RPMs for your operating system and architecture.

Lastly we will install the proper Postgres version 9.1 RPMs. As root issue the following command:

```
yum install postgresql91 postgresql91-server postgresql91-devel
```

Now that Postgres is installed we will do some basic configuration and testing to make sure our installation is ready for use with Tactic.

Again we should first familiarize ourselves with the pertinent Postgres file paths that will be used throughout the install:

## Common Paths in Postgres 9.1 on CentOS 5.7

```
/Path
var/
lib/
pgsql/9.1
Postgres
directory.

/Path
var/
lib/
pgsql/
data/
authentication
file
for
Postgres.

/Path
var/
lib/
pgsql/
startup.log
log.

/Path
var/
Postgres
pgsql/
data/
pg_log
```

If you have used the base postgresql-server install before you will notice that the above paths are slightly different than the usual paths used on CentOS. This install also varies from the base install in that the user must manually initialize the databases used by Postgres. To do this issue the following command as root:

```
/etc/init.d/postgresql-91 initdb
```

Once that command successfully completes we can then start the service. As root issue the following command:

```
/etc/init.d/postgresql-91 start
```

If the service starts successfully we can move forward. If not please view any startup errors in the Postgres startup log. Further troubleshooting help can be found at <http://postgresql.org>,

Lastly we will want to make sure the Postgres service persists through reboots. As root issue the following command:

```
/sbin/chkconfig postgresql-91 on
```

Reboot your server to ensure the service comes up appropriately.

## Installing Python 2.7

As noted above Tactic requires version 2.7 of Python. CentOS comes with, and depends on an earlier version of Python. This means we simply can't remove Python from the system as we did with Postgres. We have to create a custom Python 2.7 install and keep it separate from the base install.

First we need to install some development libraries and a compiler. As root issue the following command:

```
yum install gcc zlib-devel libxslt-devel libxml2-devel
```

Once those are installed we can get Python 2.7, as root issue the following command:

```
cd /tmp
wget http://www.python.org/ftp/python/2.7.1/Python-2.7.1.tgz
tar -zxvf Python-2.7.1.tgz
cd Python-2.7.1
./configure --prefix=/opt/python2.7
make && make install
```

This will install Python 2.7 in the custom path /opt/python2.7. You can choose a different custom install directory should you choose.

## Installing Python 2.7 Modules

Next we will install the necessary Python 2.7 modules. These provide extended functionality to the Python environment. Before we begin however we will have to set an environment variable such that the Python 2.7 modules we are installing can find their link dependencies. In the BASH shell environment as root issue the following command:

```
export LD_LIBRARY_PATH=/opt/python2.7/lib
```

This will prefix your link dependency library path with our custom python libraries ensuring they get precedence in the installation of the modules. This environment variable only exists for the current shell environment. Any new shells you open will need to have this variable set as well. We will institute a permanent solution to this problem later.

### Installing lxml 2.2.8

Tactic requires lxml version 2.2.8. At the time of writing Tactic encountered errors running with lxml 2.3 installed. Please make sure you install lxml 2.2x. Installation and setup for each module is almost the same. As root issue the following commands

```
cd /tmp
wget http://codespeak.net/lxml/lxml-2.2.8.tgz
tar -zxvf lxml-2.2.8.tgz
cd lxml-2.2.8
/opt/python/bin/python2.7 setup.py install
```

We have used the location of our custom installed python binary in the last line, if you have chosen a different install location use it instead.

Verify the installation by running your custom python binary and trying to import the module. As root issue the following command:

```
/opt/python2.7/bin/python2.7
```

You should receive a python environment and prompt similar to this:

```
Python 2.7.1 (r271:86832, Apr 12 2011, 16:16:18)
[GCC 4.1.2 20080704 (Red Hat 4.1.2-51)] on linux2
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

At the prompt please type the following:

```
import lxml
```

If you receive another prompt and no error occurs, the import was successful and lxml is installed. We will use the same procedure to check the veracity of our other modules installations as well.

## Installing Python Imaging Library 1.1.7

We follow the same procedure to install the Python Imaging Library. As root issue the following commands:

```
cd /tmp
wget http://effbot.org/downloads/Imaging-1.1.7.tar.gz
tar -zxvf Imaging-1.1.7.tar.gz
cd Imaging-1.1.7
/opt/python2.7/bin/python2.7 setup.py install
```

Check the installation of the module by loading python and issuing the following command at the python prompt.

```
import PIL
```

## Installing Pycrypto 2.3

The installation of Pycrypto also follows this template. As root issue the following commands:

```
cd /tmp
wget http://pypi.python.org/packages/source/p/pycrypto/pycrypto-2.3.tar.gz
tar -zxvf pycrypto-2.3.tar.gz
cd pycrypto-2.3
/opt/python2.7/bin/python2.7 setup.py install
```

Check the installation of the module by loading python and issuing the following command at the python prompt.

```
import Crypto
```

## Installing Psycopg2 2.3.2

Psycopg2 is a Postgres database adapter for Python. The install is akin to the previous 3 except that since we've customized our Postgres install, we have to let Psycopg2 know that as well. First lets get the package and uncompress it. As root issue the following:

```
cd /tmp
wget http://pypi.python.org/packages/source/p/psycopg2/psycopg2-2.3.2.tar.gz
tar -zxvf psycopg2-2.3.2.tar.gz
cd psycopg2-2.3.2
```

Now we have to modify the pg\_config variable in the file setup.cfg. Using your favourite editor open /tmp/psycopg2-2.3.2/setup.cfg and edit the pg\_config entry to match the following:

```
pg_config=/usr/pgsql-9.1/bin/pg_config
```

Now we should be able to install Psycopg2 properly. As root issue the following command:

```
/opt/python2.7/bin/python2.7 setup.py install
```

Check the installation of the module by loading python and issuing the following command at the python prompt.

```
import psycopg2
```

Now that all the Tactic components are installed, we can begin installing Tactic itself.

## Installing Tactic 3.6.0.v01

First we have to download the Tactic source from the Southpaw Community website. Using a web browser navigate to <http://community.southpawtech.com> and login using the support account you were assigned. After you have logged in, please click on "Downloads" in the upper right hand corner of the website. Once you are on the downloads page, you should see the download link for TACTIC Enterprise. Save the TACTIC Enterprise zip file in /tmp on the server.

Once we have the Tactic source we need to unpack it. As root issue the following commands:

```
cd /tmp
unzip tactic-3.6.0.v01.zip
```

Once the Tactic source is unpacked, you should familiarize yourself with the Tactic directory structure. The prefix of the paths will change during install, however the directory structure will remain the same.

### Common Paths in Tactic 3.6.0.v01

```
/Path
tmp/
tactic-3.6.0.v01/
tactic
documentation.
```

```
/Path
tmp/
tactic-3.6.0.v01/
tactic
source
files.
```

```
/Path
tmp/
tactic-3.6.0.v01/
tactic
install
script
and
configuration
files
for
Tactic
dependencies.
```

Before we run the Tactic installer, we must further configure Postgres to ensure proper installation of Tactic.

### Configuring Postgres

Tactic supplies a custom host based authentication file for Postgres. After stopping the Postgres service we will install the file in question, restart the service and verify that the configuration has been properly put in place. As root issue the following commands:

```
/etc/init.d/postgresql-9.1 stop
mv /var/lib/pgsql/9.1/data/pg_hba.conf /var/lib/pgsql/9.1/data/pg_hba.conf.INSTALL
cp /tmp/tactic-3.6.0.v01/src/install/postgresql/pg_hba.conf /var/lib/pgsql/9.1/data/pg_hba.conf
chown postgres:postgres /var/lib/pgsql/9.1/data/pg_hba.conf
/etc/init.d/postgresql-9.1 start
```

If the service starts successfully we can then move onto testing. If not please consult the Postgres startup log for error information. Postgres must be running as a service during the Tactic install. Next we will test the install, as root issue the following commands:

```
psql -U postgres template1
```

This command should return you to a prompt like this one:

```
template1=#
```

If you are not prompted for a password and, see this prompt, then the configuration changes have been successful. Type \q to exit.

## Installing Tactic

We are now ready to run the Tactic installer. The installer doesn't know about our custom Python installation location though, so we have edit the install.py file. Using your favorite editor, edit the file /tmp/tactic-3.6.0.v01/src/install/install.py.

Find the following line in the file:

```
python_site_packages_dir = "/usr/local/lib/python%s.%s/site-packages"
```

Replace it with the following line:

```
python_site_packages_dir = "/opt/python2.7/lib/python%s.%s/site-packages"
```

Save the file. We will test this by running the installer. Make sure you are using a shell with the LD\_LIBRARY\_PATH set as mentioned in the "Installing Python 2.7 Modules" section. As root issue the following command:

```
/opt/python2.7/bin/python2.7 /tmp/tactic-3.6.0.v01/src/install/install.py
```

The installer will ask you a number of questions. You should be prompted by the following:

```
Please enter the base path of the TACTIC installation:
```

```
(/home/apache) -> /opt/tactic
```

Choose your custom Tactic path, this will be the base directory for your Tactic installation. We have chosen /opt/tactic. Next you will be asked to identify the user used to run the Apache service.

```
Please enter the user Apache Web Server is run under:
```

```
(apache) ->
```

In many cases the default user "apache" is correct. However you can verify this easily in another shell by issuing the following command as root:

```
ps -ef | grep httpd
```

The first column of output is the username Apache is running under. Should you receive no output, make sure your httpd service is running. Under CentOS 5.7 the apache user is "apache" so we will accept the default the installer gives us.

The installer will then install the Tactic databases, configure Tactic and copy the source code into the Tactic base directory.

## Configuring Apache

Lastly Tactic requires us to install the custom Apache configuration file it has created during the installation process. As root issue the following commands:

```
cp /opt/tactic/tactic_data/config/tactic.conf /etc/httpd/conf.d
```

To test this we should first verify that /etc/httpd/conf.d is an included module path in the main Apache configuration file. As root issue the following command:

```
cat /etc/httpd/conf/httpd.conf | grep conf.d
```

If you receive the following as output we have installed the Tactic Apache configuration file correctly.

```
Include conf.d/*.conf
```

If you do not receive this output, using your favourite editor as root edit the file `/etc/httpd/conf/httpd.conf` and at the bottom of the file insert the statement listed above. Save the file.

Lastly we will create a redirect for Tactic using the `index.html` file at the document root of the Apache server. Using your favourite editor as root, edit the file `/var/www/html/index.html` to contain only the following line:

```
<META http-equiv="refresh" content="0;URL=/tactic">
```

Restart the Apache service to make sure the configuration hasn't caused any problems. As root issue the following command:

```
/etc/init.d/httpd restart
```

Lastly we need to ensure that the Apache server has loaded the modules needed for proxying and load balancing the Tactic service. As root issue the following command:

```
/usr/sbin/httpd -t -D DUMP_MODULES
```

In the resulting output look for the following modules:

```
rewrite_module (shared)
proxy_module (shared)
proxy_http_module (shared)
proxy_balancer_module (shared)
deflate_module (shared)
```

The CentOS 5.7 install of Apache includes a large array of modules enabled by default, including the ones required by Tactic.

## Starting Tactic in Development Mode

We are now prepared to start the Tactic service for the first time. Tactic must be run as the Apache user. Usually we would `su` to the apache user, however since its a system account without a login this will not work without optionally telling `su` to give the Apache user a shell environment. In a shell with the `LD_LIBRARY_PATH` set as laid out in the section "Installing Python 2.7 Modules", as root issue the following command:

```
su apache -s /bin/bash -c "/opt/python2.7/bin/python2.7 /opt/tactic/tactic/src/bin/
startup_dev.py"
```

You should see the following output:

```
Registering site ... admin
Registering site ... sthpw
Registering site ... default

Starting TACTIC ...

Starting Scheduler ....
[08/Nov/2011:23:13:20] ENGINE Bus STARTING
[08/Nov/2011:23:13:20] ENGINE Started monitor thread '_TimeoutMonitor'.
[08/Nov/2011:23:13:20] ENGINE Started monitor thread 'Autoreloader'
[08/Nov/2011:23:13:21] ENGINE Serving on 127.0.0.1:8081
[08/Nov/2011:23:13:21] ENGINE Bus STARTED
```

You should now be able to navigate a web browser to `http://localhost/tactic/admin`. Alternatively use the non-local IP address or fully qualified domain name you have assigned to your Tactic server in place of localhost. You should see the Tactic login screen.

Tactic defines an administrative user by default. The login information is: Use

Username: admin, Password: (set it  
on your first login)



In 3.9, the login screen requires you to change the password immediately. You will have to type it in twice to confirm.

## Installing Tactic as a Service

You can use the key combination CTRL+c in the shell running the Tactic Development mode service to stop it when you are ready

The Tactic service file is simple to install, however due to the custom Python pathing we have used we have edit the Tactic service file to reflect those changes. As root, using your favourite editor open the file `/opt/tactic/tactic/src/install/service/tactic` and make the following changes.

The Python environment variable `PYTHON` should be set to the path of our custom Python binary.

```
PYTHON=/opt/python2.7/bin/python2.7
```

Additionally we want to setup the `LD_LIBRARY_PATH` variable to include our custom Python libraries. Under the following line:

```
export PYTHON
```

Add the following lines to the file:

```
LD_LIBRARY_PATH=/opt/python2.7/lib
export LD_LIBRARY_PATH
```

Lastly, Tactic startup uses the same mechanism as Developer mode, however this is not yet reflected in the Tactic service file. Change the following line:

```
su - $TACTIC_USER -m -c "$LAUNCH" >> $LOG 2>&1 &
```

To this:

```
su $TACTIC_USER -s /bin/bash -m -c "$LAUNCH" >> $LOG 2>&1 &
```

Save the file.

One last Python path must be corrected before we install the Tactic service. During installation Tactic created a file that you will become more familiar with throughout your use of Tactic. That file is `/opt/tactic/tactic_data/config/tactic_linux-conf.xml`. Using your favourite editor as root edit this file. Find the following line:

```
<python>python</python>
```

And replace it with:

```
<python>/opt/python2.7/bin/python2.7</python>
```

Save the file.

Now we will install the Tactic service. As root type the following:

```
cp /opt/tactic/tactic/src/install/service/tactic /etc/init.d/tactic
chmod 755 /etc/init.d/tactic
/sbin/chkconfig tactic on
/etc/init.d/tactic start
```

Tactic should now start properly as a service. Test this by launching a web browser and navigating to the Tactic login page as you did previously. If you are having trouble the following error logs will help you diagnose your problems:

### Common Error Logs

```
/Path
/opt/
```



## TACTIC Install - CentOS 6.2

While there may be some slight variations in the steps in different versions of CentOS 6, this guide can be used for CentOS 6.x as a reference.

### Requirements

TACTIC requires the following software to be installed:

- Apache HTTP server 2.2
- Postgres Database Server 8.4 or higher
- Python 2.6 or 2.7 with the following Python modules:
  - Python Imaging Library 1.1.7
  - Python lxml 2.3.5
  - Pycrypto 2.3
  - Psycog2 2.4.6

It should be noted that while there may be newer versions of these Python modules, TACTIC 3.9.0.rc04 has been tested with these particular versions.

### Disabling Security for Testing

To get TACTIC up quickly without fiddling with OS security, it is prudent to disable firewalling and SELinux. This is by no means an endorsement to run your server without these services. Once you have TACTIC up and running, you are advised to read the section <TACTIC SECURITY>.

CentOS 6.2 uses the iptables service as a firewall. To disable this temporarily, you can issue the following commands as root.

```
/etc/init.d/iptables save  
/etc/init.d/iptables stop
```

This will disable the firewall for the currently running CentOS session. Should you wish these settings to persist across reboots, you can issue the following command as root.

```
/sbin/chkconfig iptables off
```

To disable SELinux, edit the file /etc/selinux/config as root with your editor of choice and set the SELINUX variable to 'disabled'.

```
SELINUX=disabled
```

Since getting this setting to take effect requires a reboot, you can also issue the following command for it to take effect immediately.

```
echo 0 > /selinux/enforce
```

### Installing Apache HTTP server

In case Apache 2.2 is not already pre-installed on CentOS 6.2, issue the following command as root:

```
yum install httpd
```

This package has several dependencies and they should be installed as well.

It would be good to familiarize yourself with some of the more pertinent paths in the Apache installation on CentOS 6.2. They are listed below for your convenience.

### Table 1. Common Paths in Apache 2.2

/etc/httpd/conf/httpd.conf	Path to the main Apache configuration file.
/etc/httpd/conf.d/	Path to the Apache dynamic configuration directory.
/var/log/httpd/error.log	Path the the Apache error log.
/var/www/html	Path to the Document Root folder of the base Apache install.

It's best to test your Apache install at this point. The included main Apache configuration file is enough to get the server started. You will need create a small html file to do this. Using your editor of choice, create a file called index.html, with the content as follows:

```
<html>
  <head>
    <title>Apache Base Install</title>
  </head>
  <body>
    <p>Apache Install Successful</p>
  </body>
</html>
```

Save the file in /var/www/html and issue the following command as root to ensure proper permissions are set:

```
chmod 755 /var/www/html/index.html
```

The Apache server can be started. As root, issue the following command:

```
/etc/init.d/httpd start
```

The service should start successfully. Otherwise, consult the Apache error log listed above to discover any problems that may have occurred.

At last, you can point a web browser to the IP address associated with the server. If you see the text "Apache Install Successful", then your server is up and running and can serve pages properly.

Finally, to make the Apache service persist through reboots, issue the following command as root:

```
/sbin/chkconfig httpd on
```

Then reboot the server and make sure that httpd comes up on reboot and that you can view the test page properly. Later in the install, the Apache server will be configured to interact with TACTIC properly.

## Installing Postgres Database Server

TACTIC requires PostgreSQL version 8.4 or higher. First we must make sure that we didn't include the default version Postgres in our base install. As root please issue the following command:

```
rpm -qva | grep -i postgres
```

This command will search your installed packages and filter the output for any packages containing the work postgres. If you receive any output from this command please uninstall the packages by issuing the following command:

```
rpm -e <package_name>
```

Where <package\_name> is the name of the package you wish to uninstall. Consult the RPM or Yum manpages for further instructions on installing and uninstalling packages.

Lastly before installing any new Postgres repository, we want to make sure to exclude the default version of Postgres from showing up in the base and update Yum repositories included with the operating system itself. Using a text editor, edit the file `/etc/yum.repos.d/CentOS-Base.repo` to include the line under both the `[base]` section and the `[updates]` section of the file. :

```
exclude=postgresql*
```

Save the file. For more information on the Yum installer and repository system please see the manpages for yum or the yum website <http://yum.baseurl.com>

Once we have uninstalled any previous versions of Postgres, we can then proceed installing a new Yum repository that contains the version of Postgres we want to install. As root issue the following commands:

```
rpm -Uvh http://yum.postgresql.org/9.2/redhat/rhel-6-x86_64/pgdg-centos92-9.2-6.noarch.rpm
```

At the time of writing the current version of Postgres was 9.2-6, for more current installation versions please visit <http://yum.pgrpm.org/repopackages.php> and view the available repository RPMs for your operating system and architecture.

Lastly, we will install the proper Postgres version 9.2 RPMs. As root, issue the following command:

```
yum install postgresql postgresql-server postgresql-contrib postgresql-devel
```

Now that Postgres is installed, you are advised to make some basic configuration to make sure the installation is ready for use with TACTIC.

Here are the pertinent Postgres file paths that will be used throughout the install:

## Table 2. Common Paths in Postgres 9.2 on CentOS 6.2

<code>/var/lib/pgsql/9.2</code>	Path to the main Postgres directory.
<code>/var/lib/pgsql/data/pg_hba.conf</code>	Path to the host based authentication file for Postgres.
<code>/var/lib/pgsql/9.2/pgstartup.log</code>	Path to the Postgres startup log.
<code>/var/lib/pgsql/9.2/data/pg_log</code>	Path to Postgres database logs.

Initialize the database:

```
su - postgres -c /usr/pgsql-9.2/bin/initdb
```

Once that command successfully completes we can then start the service. As root issue the following command:

```
service postgresql-9.2 start
```

If the service starts successfully, we can move forward. Otherwise, you can review any startup errors in the Postgres startup log. Further troubleshooting help can be found at <http://postgresql.org>.

Lastly, to make sure the Postgres service persist through reboots. you will issue the following command:

```
chkconfig --levels 235 postgresql-9.2 on
```

Reboot your server to ensure the service comes up appropriately.

## Installing Python Devel for the preinstalled Python

As noted above TACTIC requires version 2.6 or 2.7 of Python. In CentOS 5.x, we used to recommend installing Python 2.7 along side the built-in Python 2.4. In CentOS 6.2, the built-in Python 2.6.6 already suffices.

First, we need to install some development libraries and a compiler. As root issue the following command:

```
yum install gcc zlib-devel libxslt-devel libxml2-devel
yum install python-devel
```

This will install the Python Devel and all the other relevant libraries to install the various Python modules.

## Installing Python Modules

### Installing lxml 2.3.5

TACTIC requires lxml version 2.2 or above. 2.3.5 is used at the time of writing. As root, issue the following commands:

```
cd /tmp
wget http://lxml.de/files/lxml-2.3.5.tgz
tar -zxvf lxml-2.3.5.tgz
cd lxml-2.3.5
python setup.py install
```

Verify the installation by running your custom python binary and trying to import the module. As root issue the following command:

```
python
```

You should receive a python environment and prompt similar to this:

```
Python 2.6.6 (r271:86832, Apr 12 2011, 16:16:18)
[GCC 4.1.2 20080704 (Red Hat 4.1.2-51)] on linux2
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

At the prompt please type the following:

```
import lxml
```

If you receive another prompt and no error occurs, the import was successful and LXML is installed. We will use the same procedure to check the veracity of our other modules installations as well.

### Installing Python Imaging Library 1.1.7

We follow the same procedure to install the Python Imaging Library. As root issue the following commands:

```
cd /tmp
wget http://effbot.org/downloads/Imaging-1.1.7.tar.gz
tar -zxvf Imaging-1.1.7.tar.gz
cd Imaging-1.1.7
/opt/python2.7/bin/python2.7 setup.py install
```

Check the installation of the module by loading python and issuing the following command at the python prompt:

```
import PIL
```

### Installing Pycrypto 2.3

The installation of Pycrypto also follows this template. As root issue the following commands:

```
cd /tmp
wget http://pypi.python.org/packages/source/p/pycrypto/pycrypto-2.3.tar.gz
tar -zxvf pycrypto-2.3.tar.gz
```

```
cd pycrypto-2.3
python setup.py install
```

Check the installation of the module by loading python and issuing the following command at the Python prompt:

```
import Crypto
```

## Installing Psycopg2 2.4.6

Psycopg2 is a Postgres database adapter for Python. The install is akin to the previous 3 except that since we've customized our Postgres install, we have to let Psycopg2 know that as well. First lets get the package and uncompress it. As root issue the following:

```
yum install postgresql-libs

cd /tmp
wget http://initd.org/psycopg/tarballs/PSYCOPG-2-4/psycopg2-2.4.6.tar.gz
tar -zxvf psycopg2-2.4.6.tar.gz
cd psycopg2-2.4.6
```

Now we have to modify the pg\_config variable in the file setup.cfg. Using your editor to open /tmp/psycopg2-2.4.6/setup.cfg and edit the pg\_config entry to match the following:

```
pg_config=/usr/pgsql-9.2/bin/pg_config
```

Now we should be able to install Psycopg2 properly. As root issue the following command:

```
python setup.py install
```

Check the installation of the module by loading python and issuing the following command at the python prompt:

```
import psycopg2
```

Now that all the TACTIC components are installed, we can begin running the TACTIC installer.

## Installing Tactic 3.9.0.rc04

First we have to download the TACTIC source from the Southpaw Community website. Using a web browser navigate to <http://community.southpawtech.com>. After you have logged in, please click on "Downloads" in the upper right hand corner of the website. Once you are on the downloads page, you should see the download link for the latest TACTIC Enterprise. Save the TACTIC Enterprise zip file in /tmp on the server.

Once we have the Tactic source we need to unpack it. As root issue the following commands:

```
cd /tmp
unzip tactic-3.9.0.rc04.zip
```

Once the TACTIC source is unpacked, you should familiarize yourself with its directory structure. The prefix of the paths will change during install; however, the directory structure will remain the same.

### Table 3. Common Paths in Tactic 3.9.0.rc04

/tmp/tactic-3.9.0.rc04/doc	Path to the Tactic documentation.
/tmp/tactic-3.9.0.rc04/src	Path to the Tactic source files.
/tmp/tactic-3.9.0.rc04/src/install	Path to the Tactic install script and configuration files for Tactic dependencies.

---

Before we run the Tactic installer, we must further configure Postgres to ensure proper installation of Tactic.

## Configuring Postgres

Tactic supplies a custom host based authentication file for Postgres. After stopping the Postgres service we will install the file in question, restart the service and verify that the configuration has been properly put in place. As root issue the following commands:

```
service postgresql-9.2 stop
mv /var/lib/pgsql/9.2/data/pg_hba.conf /var/lib/pgsql/9.2/data/pg_hba.conf.INSTALL
cp /tmp/tactic-3.9.0.rc04/src/install/postgresql/pg_hba.conf /var/lib/pgsql/9.2/data/pg_hba.conf
chown postgres:postgres /var/lib/pgsql/9.2/data/pg_hba.conf
service postgresql-9.2 start
```

If the service starts successfully we can then proceed to verification. If not please consult the Postgres startup log for error information. Postgres must be running as a service during the Tactic install. Next we will test the install. As root, issue the following command:

```
psql -U postgres template1
```

This command should fire up a prompt like this:

```
template1=#
```

If you can see this prompt without being asked for a password, the configuration changes have been successful. Type \q to exit.

## Installing Tactic

```
python /tmp/tactic-3.9.0.rc03/src/install/install.py
```

The installer will ask you a number of questions. You should be prompted by the following:

```
Please enter the base path of the TACTIC installation:
```

```
(/home/apache) -> /opt/tactic
```

Choose your custom Tactic path, this will be the base directory for your Tactic installation. We have chosen /opt/tactic. Next you will be asked to identify the user used to run the Apache service.

```
Please enter the user Apache Web Server is run under:
```

```
(apache) ->
```

In many cases the default user "apache" is correct. However you can verify this easily in another shell by issuing the following command as root:

```
ps -ef | grep httpd
```

The first column of output is the username Apache is running under. Should you receive no output, make sure your httpd service is running. Under CentOS 6.2 the apache user is "apache" so we will accept the default the installer gives us.

The installer will then install the Tactic databases, configure Tactic and copy the source code into the Tactic base directory.

## Configuring Apache

Lastly Tactic requires us to install the custom Apache configuration file it has created during the installation process. As root issue the following commands:

```
cp /opt/tactic/tactic_data/config/tactic.conf /etc/httpd/conf.d
```



To test this we should first verify that `/etc/httpd/conf.d` is an included module path in the main Apache configuration file. As root issue the following command:

```
cat /etc/httpd/conf/httpd.conf | grep conf.d
```

If you receive the following as output we have installed the Tactic Apache configuration file correctly.

```
Include conf.d/*.conf
```

If you do not receive this output, using your editor as root edit the file `/etc/httpd/conf/httpd.conf` and at the bottom of the file insert the statement listed above. Save the file.

Lastly we will create a redirect for Tactic using the `index.html` file at the document root of the Apache server. Using a text editor as root, edit the file `/var/www/html/index.html` to contain only the following line:

```
<META http-equiv="refresh" content="0;URL=/tactic">
```

Restart the Apache service to make sure the configuration hasn't caused any problems. As root issue the following command:

```
/etc/init.d/httpd restart
```

Lastly we need to ensure that the Apache server has loaded the modules needed for proxying and load balancing the Tactic service. As root issue the following command:

```
/usr/sbin/httpd -t -D DUMP_MODULES
```

In the resulting output look for the following modules:

```
rewrite_module (shared)
proxy_module (shared)
proxy_http_module (shared)
proxy_balancer_module (shared)
deflate_module (shared)
```

The CentOS 6.2 install of Apache includes a large array of modules enabled by default, including the ones required by Tactic.

## Starting Tactic in Development Mode

We are now prepared to start the Tactic service for the first time. Tactic must be run as the Apache user. Usually we would `su` to the apache user, however since its a system account without a login this will not work without optionally telling `su` to give the Apache user a shell environment. In a shell with the `LD_LIBRARY_PATH` set as laid out in the section "Installing Python 2.7 Modules", as root issue the following command:

```
su apache -s /bin/bash -c "/opt/python2.7/bin/python2.7 /opt/tactic/tactic/src/bin/
startup_dev.py"
```

You should see the following output:

```
Registering site ... admin
Registering site ... sthpw
Registering site ... default

Starting TACTIC ...

Starting Scheduler ....
[08/Nov/2011:23:13:20] ENGINE Bus STARTING
[08/Nov/2011:23:13:20] ENGINE Started monitor thread '_TimeoutMonitor'.
[08/Nov/2011:23:13:20] ENGINE Started monitor thread 'Autoreloader'
[08/Nov/2011:23:13:21] ENGINE Serving on 127.0.0.1:8081
[08/Nov/2011:23:13:21] ENGINE Bus STARTED
```

You should now be able to navigate a web browser to `http://localhost/tactic/admin`. Alternatively, use the non-local IP address or fully qualified domain name you have assigned to your TACTIC server in place of localhost. You should see the TACTIC login screen.

TACTIC defines an administrative user by default. The login information is:

Username: admin, Password: (set it on your first login)

In 3.9, the login screen requires you to change the password immediately. You will have to type it in twice to confirm.

## Installing TACTIC as a Service

The TACTIC service file is simple to install

Use the key combination CTRL+c in the shell running TACTIC in Development mode to stop it first when you are ready to run TACTIC as a service.

Change the following line in the file `/opt/tactic/tactic/src/install/service/tactic`:

```
su - $TACTIC_USER -m -c "$LAUNCH" >> $LOG 2>&1 &
```

to this:

```
su $TACTIC_USER -s /bin/bash -m -c "$LAUNCH" >> $LOG 2>&1 &
```

Save the file.

Now as root, type the following:

```
cp /opt/tactic/tactic/src/install/service/tactic /etc/init.d/tactic
chmod 755 /etc/init.d/tactic
/sbin/chkconfig tactic on
/etc/init.d/tactic start
```

TACTIC should now start properly as a service. Test this by launching a web browser and navigating to the TACTIC login page as you did previously. If you are having trouble, the following error logs will help you diagnose your problems:

### Table 4. Common Error Logs

<code>/opt/tactic/tactic_temp/log/stdout.log</code>	Path to the TACTIC standard out log assuming you have chosen <code>/opt/tactic</code> as the base installation path
<code>/var/log/tactic</code>	Path to the TACTIC error log in service mode
<code>/var/log/httpd/error_log</code>	Path to the Apache error log
<code>/var/log/httpd/access_log</code>	Path to the Apache access log

Finally, reboot the server and test whether the TACTIC service continues to perform across reboots. You are advised to set up log rotation by reviewing the Rotate Log section in the Sys Admin documentation.

## TACTIC Install - Windows Server 2008

To completely install TACTIC Enterprise, there are three main components that have to be set up in the following order:

1. A Database
2. The TACTIC Installer
3. A Web Server

### Install the Database

TACTIC stores all metadata in a database called PostgreSQL. This is an industrial strength, hugely scalable database that has proven itself in thousands of industries around the world. Go to the PostgreSQL website for more information.

1. From the PostgreSQL site (<http://www.postgresql.org>), download the .msi file for the latest binary distribution. We have encountered no problems using any of the versions above 8.4. You can find the binary distribution at this site. Follow the installation wizard for PostgreSQL. It is safe to choose all of the default settings if you do not have much experience with the PostgreSQL. It is best not to set a password during installation, although the Windows installer may force you to set one up.
2. Unzip Tactic Enterprise in a temporary location like C:/temp
3. It is mandatory you edit the "pg\_hba.conf" file after installation

It is located in C:/Program Files/PostgreSQL/<version>/data This file determines all of the user permissions for PostgreSQL. You can open this file with any text editor like notepad. To begin with, turn on all of the permissions contained in this file. This is a temporary measure that will greatly simplify the installation process. You may lock down these permissions at a later date. Please consult the PostgreSQL documentation on how to do this. TACTIC ships with a sample "pg\_hba.conf" file (located in <TACTIC\_unzipped\_package>/src/install/postgresql/pg\_hba.conf). This file has an open security setting for ease of installation. It's best to back up your current pg\_hba.conf file before copying over with the file provided by TACTIC. Note: in Windows, you would need to comment out the line

```
local all all trust
```

You add a comment by putting a '#' at the beginning of the line like this:

```
#local all all trust
```

4. Add the PostgreSQL bin directory to the environment path in Advanced System Settings: C:\Program Files\PostgreSQL\<version>\bin\

To do this, go to Start --> Control Panel. If it's organized in category mode, go to system and security --> system. If its not categorized, you should see system directly. In system, find advanced system and settings --> go to the advanced tab --> Environment variables. Now in the system variables box, Navigate to the variable "Path". Add the bin directory to the end of the value.

5. Restart the PostgreSQL Service:

You can go to the control panel again to do this. If it's organized in category mode, go to system and security --> administrative tools. If it's not categorized, you will see administrative tools directly. Inside, you can find services. Find the postgresql service and restart it. Note: If you have command prompt open, you need to reopen it for the environment variable to take effect.

## Verification

Verify that psql works in the command prompt:

```
> psql -U postgres template1
```

It should give you a prompt:

```
template1=#
```

If you see this prompt without the need to enter a password, you have successfully installed the PostgreSQL database. Type \q to exit.

## Install TACTIC

### Windows

Unfortunately, Python is not preinstalled on Windows machines; however, with the installer this is not difficult.

The Python installer does not set the Python path, so this must be added

1. Go to **Start->Control Panel->System**
2. Click on the "Advanced" tab.
3. Select "Path" under "System Variables" and click the "Edit" button.
4. Add Python to the environment path: "C:\Python26\" to the end of the "Variable Value"

To test that Python is working from the command prompt, run the command: **python**

You should get the following prompt:

```
Python 2.6.2 (#67, Sep 28 2009, 12:41:11) [MSC v.1310 32 bit (Intel)] on win32
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

#### 1. Install Python and supporting modules

The TACTIC source code is written in Python. As such, the complete codebase is open.

To install Python, you can find an msi at <http://www.python.org>. TACTIC requires Python 2.6 or higher.

TACTIC also requires a number of Python modules to function correctly. These modules are generally not installed by default with the standard Python distributions. For Windows, they are already packaged in a file `python_modules.zip` available for download in the release section of the downloads page at <http://community.southpawtech.com/downloads>

- **PIL 1.1.7** (Python Image Library)
  - **ImageMagick 6.7.8** (A command line program which complements PIL) - <http://www.imagemagick.org>
  - **FFmpeg version 0.6**(Solution to record, convert and stream audio and video and metadata parsing) - <http://www.ffmpeg.org>
  - **psycopg2 2.3.1** (Database connectivity)
  - **PyCrypto version 2.0.1/2.1** (For de-encrypting the license file) - <http://www.amk.ca/python/code/crypto>
  - **simplejson 2.1.1 (not needed since Python 2.6)** simplejson.egg can be installed with the EasyInstaller. It is need for JSON string encoding and parsing
  - **lxml 2.1 or 2.2** (XML and XPath processing)
  - **pywin32-(build 2##)** (Python Windows OS module)
2. If you haven't done so already above, unzip Tactic Enterprise in a temporary location like C:/temp
  3. Go to **C:/temp/tactic\_#.#.#/src/install/**

```
# cd C:/temp/tactic_#.#.#/src/install
```

#### 4. Execute: **install.py**



### Note

You must invoke the installation with root user privileges because it attempts to write to the <python\_install>/site-packages directory.

```
# python install.py
```

The installer will ask a number of questions. First it ask for the <TACTIC\_BASE\_DIR>:

```
Please enter the base path of the TACTIC installation:
```

```
(C:/Program Files/Southpaw) ->
```

It would copy the source code to the base path. An Apache Web Server file will be generated at the end which you would need to copy to the Apache config area upon installation of the web server. If there are existing files in the destination directory the installer will ask for your confirmation to remove it. At the end, you will see this:

```
Installing service TacticService
Changing service configuration
Service updated
```

```
*** Installation of TACTIC completed at [C:/Program Files/Southpaw] ***
```

```
Next, please install the Apache Web Server and then copy the Apache config extension
[C:/Program Files/Southpaw/tactic_data/config/tactic_win32.conf] to the Apache web server
config area. e.g.
C:/Program Files/Apache Software Foundation/Apache2.2/conf
```

### Verification

When the installation is completed, an asset directory will be created at '<TACTIC\_BASE\_DIR>/assets'.

The file `tactic_paths.py` will be created in the following directories:

---

Windows	C:/Python##/Lib/site-packages/tacticenv
---------	-----------------------------------------

---

Default contents:

TACTIC_INSTALL_DIR='C:/Program	Files/Southpaw/tactic'	TACTIC_SITE_DIR=''
TACTIC_DATA_DIR='C:/Program Files/Southpaw/tactic_data'		

---

### Network machine access

If you are on the server, you can access it by using the URL `http://localhost/tactic`. For other people to access it on the network, you need to find out its IP address. In a linux server, you can use the command "ifconfig" to locate it. It's the one listed as the inet addr.

Next, you need to run TACTIC behind Apache.

## Install the Web Server

TACTIC should be run behind an Apache web server. You can download Apache software at <http://www.apache.org/>

The TACTIC application server is able to serve up static content such as images, PDF files, Quicktime files, and so on, but it is not the most efficient at this because it is written in Python. This is what Apache is designed for. By running TACTIC behind Apache, it relieves TACTIC from serving the static content so that it can focus on the dynamic content.

For production use, it is highly recommended that TACTIC is run behind the Apache server. This has many scalability advantages. When running behind Apache, Apache uses a reverse proxy and proxy balancer module to forward requests to communicate with TACTIC.

## Windows

After the installation, some changes may need to be made in the "httpd.conf" file for Apache.

```
C:/Program Files/Apache Software Foundation/Apache2.2/conf/httpd.conf
```

Make sure the following lines are uncommented:

```
LoadModule rewrite_module modules/mod_rewrite.so
LoadModule proxy_module modules/mod_proxy.so
LoadModule proxy_http_module modules/mod_proxy_http.so
LoadModule proxy_balancer_module modules/mod_proxy_balancer.so
LoadModule deflate_module modules/mod_deflate.so
```

These lines may already be uncommented, depending on your distribution and version of Apache. You need version 2.0.31 or later.

The TACTIC installer generates an Apache extension conf file on completion. You need to copy that file to a directory that is recognized by Apache.

For Windows: this directory is:

```
C:/Program Files/Apache Software Foundation/Apache2.2/conf
```

You must add the following line to the "httpd.conf" file so that it will read the extension conf file provided by the installer:

```
Include conf/tactic_win32.conf
```

## Web Server configuration

In our provided file:

```
tactic_win32.conf
```

Make sure the following lines exist:

```
# Using the ProxyPass directives
ProxyPreserveHost on

<Proxy balancer://tactic>
BalancerMember http://localhost:8081/tactic
BalancerMember http://localhost:8082/tactic
BalancerMember http://localhost:8083/tactic
</Proxy>
ProxyPass /tactic balancer://tactic
ProxyPass /tactic_data balancer://tactic
```



### Note

Warning: For load balancing, only use either:

1) the Proxy Balancer method (recommended)

**or**

2) the RewriteRule method (not recommended).

Do **not** use both methods at the same time.



## Note

For configuring load-balancing set-up in a real production, please refer to the Load Balancing section in the Sys-admin docs.



## Note

When trying to set up Apache on a Windows Server, to specify a share folder for Apache to use, you may need to include the name of the share folder in the path.

For example, use the following if you have named the share folder "my\_share":

```
Alias /assets "//10.0.0.17/my_share/assets"
```

Note: For configuring load-balancing set-up in a real production, please refer to the Load Balancing section of this Sys-admin doc.

Finally, after verifying the configuration is correct, restart the Apache service:

You can do it in the Windows Services UI or through the task tray and right click on the Apache icon.

## Run TACTIC in development mode

Go to the <TACTIC\_INSTALL\_DIR>/src/bin folder

**cd C:/Program Files/Southpaw/tactic/src/bin**

**python startup\_dev.py**

This "startup\_dev.py" script is the development script which will dump output to the screen. The other startup script "startup.py" is the production start-up script and will dump output to a log file. The development start-up script is also much slower as it monitors the file system to see if any files have changed.

The output would look like the following:

```
Registering site ... admin
Registering site ... default
Registering site ... test
Registering site ... my_project

Starting TACTIC ...

05/Jul/2007:11:16:29 CONFIG INFO Server parameters:
05/Jul/2007:11:16:29 CONFIG INFO server.environment: development
05/Jul/2007:11:16:29 CONFIG INFO server.log_to_screen: True
05/Jul/2007:11:16:29 CONFIG INFO server.log_file: D:/tactic_temp/log/tactic_log
05/Jul/2007:11:16:29 CONFIG INFO server.log_tracebacks: True
05/Jul/2007:11:16:29 CONFIG INFO server.log_request_headers: True
05/Jul/2007:11:16:29 CONFIG INFO server.protocol_version: HTTP/1.0
05/Jul/2007:11:16:29 CONFIG INFO server.socket_host:
05/Jul/2007:11:16:29 CONFIG INFO server.socket_port: 8081
05/Jul/2007:11:16:29 CONFIG INFO server.socket_file:
05/Jul/2007:11:16:29 CONFIG INFO server.reverse_dns: False
05/Jul/2007:11:16:29 CONFIG INFO server.socket_queue_size: 10
05/Jul/2007:11:16:29 CONFIG INFO server.thread_pool: 5
05/Jul/2007:11:16:30 HTTP INFO Serving HTTP on http://localhost:8081/
```



[http://<TACTIC\\_server\\_address>/tactic/admin/](http://<TACTIC_server_address>/tactic/admin/)

You should see the TACTIC login appear.



There is a default user created on installation. This is the "admin" user and this user has the ability to see and change all aspects of the system. Log in as the admin user:

**user:**                      **admin**

**password:**                **tactic**

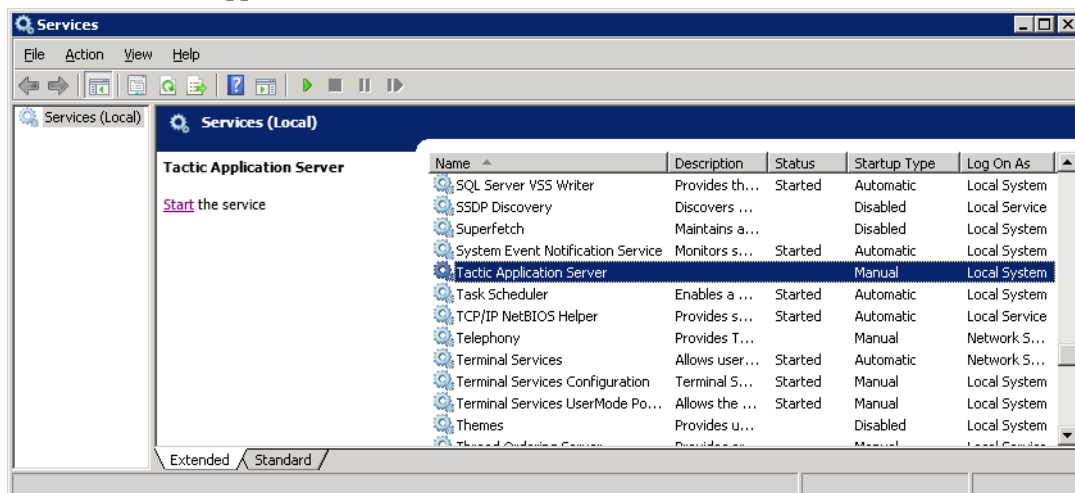
## Run TACTIC in service mode

Note: The TACTIC service should have been set up during the installation. You just need to start it.

First, stop TACTIC running in dev mode if applicable by pressing Ctrl + C in that shell

In Windows, :

**Start the "Tactic Application Server" in Windows Services UI.**



At this point you will need to install a TACTIC license file and then begin to set up a project.

- For more information on installing the license file, please refer to the **License Installation Documentation**.
- For more information on getting started with projects, please refer to the **Sys Admin Project Guides**.

#### **Note on supplementary directories used in TACTIC:**

In the config file <TACTIC\_DATA\_DIR>/config/tactic-conf.xml, you will find different references to directory under the path /home/apache like /home/apache/tactic\_temp , assets, and handoff. They are there because /home/apache is the base directory chosen for installation. You will find the Windows equivalent in the Windows installation. It could be different in your case. In the future, you can change their locations by editing the config file. If the assets directory is changed, ensure it's also updated in the Apache Web server config extension tactic.conf.

## **System Info Page**

To view different information about the system and set-up, you can go to the Global --> System Info page. For example, you can verify if load-balancing is set up and certain key directories are writable by TACTIC.

## **Troubleshooting**

- If you see missing images on logging in or errors in the output log saying certain js files are not found, it means the Apache extension file tactic.conf is not being referenced or you have not updated the paths in it to reflect current <TACTIC\_INSTALL\_DIR>. For example, if your <TACTIC\_INSTALL\_DIR> is /home/apache/tactic, you should see the line in tactic.conf:

```
Alias /context C:/Program Files/Southpaw/tactic/src/context
```

- If you try to check in a Preview Image and can't see the icon generated, your assets alias in the Apache extension file may not be in sync with the asset\_base\_dir in the TACTIC config file tactic\_linux-conf.xml

```
Alias /assets C:/ProgramData/Southpaw/assets
```

should point to the asset\_base\_dir as found in tactic\_win32-conf.xml

```
<asset_base_dir>C:/ProgramData/Southpaw/assets</asset_base_dir>
```

- If you want to re-run install.py, the installation will ask if you to confirm backing up the sthpw database before dropping it. If you choose to do it yourself, here is the command:

```
pg_dump -c -U postgres sthpw > sthpw_backup.sql
dropdb -U postgres sthpw
```

- If you try to connect to the http://<server IP>/tactic and it just times out, your server firewall could be blocking access.
- If the Windows TACTIC Service has trouble starting up, you can try to edit the Properties , go to Log On tab, and adjust the Log on as user with the Windows login which has write/read access to the tactic\_temp location as well as the asset\_base\_dir location.

# How to Install TACTIC on Fedora 12

Below are the step-by-step instructions of how to install TACTIC on Fedora 12.

## Fedora 12

There are no known issues with running a TACTIC server on Fedora 12.

Southpaw Technology has chosen to distribute their virtual machine for evaluation on Fedora 12.

1. Log in as the root user.

2. Open the passwd file.

```
vi /etc/passwd
```

Modify the apache home directory and login shell to look like the following:

```
apache:x:48:48:Apache:/home/apache:/bin/bash
```

3. Set password for apache to: south123paw

```
passwd apache
```

4. Open to the sudoers file.

```
visudo
```

Add the apache user by including the following line in the appropriate location in the file:

```
apache ALL=(ALL) ALL
```

5. Create the home directory for apache.

```
mkdir /home/apache  
chown apache:apache /home/apache  
chmod a+rx /home/apache
```

6. Disable SELinux.

```
vi /etc/selinux/config
```

7. Install modules.

```
yum install -y gcc zlib-devel samba libxslt-devel libxml2-devel postgresql-server postgresql-devel
```

8. Disable firewall.

```
/etc/init.d/iptables save  
/etc/init.d/iptables stop
```

9. Create and open the index.html for redirection.

```
vi /var/www/html/index.html
```

Insert the following contents:

```
<META http-equiv="refresh" content="0;URL=/tactic">
```

10. Re-login as the apache user.

11.Download the TACTIC source code and setup the service.

Open the following link in a web browser

```
http://support.southpawtech.com/downloads
```

Setup the TACTIC service.

```
cd /tmp
unzip tactic_#.##.##.zip
sudo cp /tmp/tactic_#.##.##/src/install/service/tactic /etc/init.d
sudo chmod 775 /etc/init.d/tactic
sudo /sbin/chkconfig tactic on
```

12.Setup Postgres.

```
sudo /etc/init.d/postgresql start
sudo cp /tmp/tactic_#.##.##/src/install/postgresql/pg_hba.conf /var/lib/pgsql/data
sudo chown postgres:postgres /var/lib/pgsql/data/pg_hba.conf
sudo /sbin/chkconfig postgresql on
sudo /etc/init.d/postgresql restart
```

13.Setup Apache.

```
sudo cp /home/apache/tactic_data/config/tactic.conf /etc/httpd/conf.d/
sudo /sbin/chkconfig httpd on
sudo /etc/init.d/httpd start
```

14.Install TACTIC.

```
cd /tmp/tactic_#.##.##/src/install
sudo python install.py
sudo /sbin/chkconfig tactic on
sudo chown -R apache:apache /home/apache/tactic /home/apache/assets /home/apache/
tactic_data /home/apache/tacticTemp
```

15.Upgrade the database.

```
python /home/apache/tactic/src/bin/upgrade_db.py
```

16.Startup TACTIC in dev mode.

```
python /home/apache/tactic/src/bin/startup_dev.py
```

17.Try accessing TACTIC through a web browser on a client machine.

18.Once startup\_dev works, Ctrl^C out of the process.

```
Ctrl^C
```

19.Start TACTIC as a service.

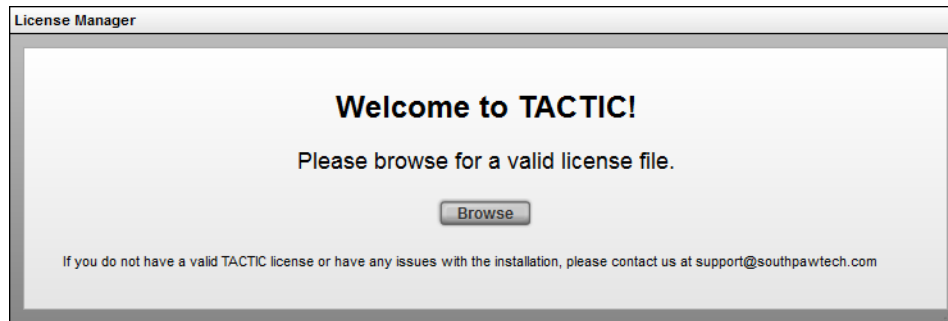
```
sudo /etc/init.d/tactic start
```

End of installation instructions.

## Install a TACTIC License

### Install License

When TACTIC is accessed through the web browser, if a license file cannot be found, TACTIC will prompted for a license file.



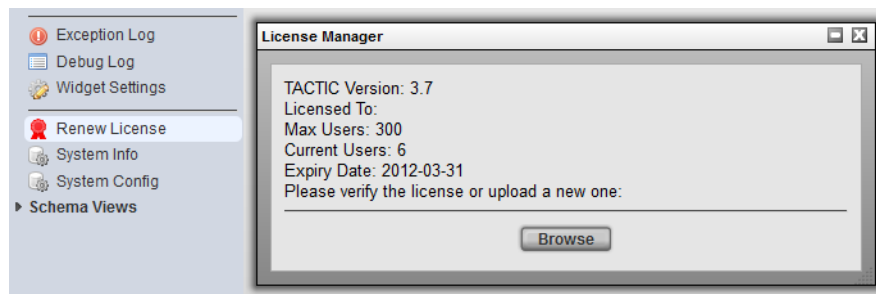
To install a license file, browse for the license file (.xml) provided by Southpaw Technology. Once the file has been selected for upload, click **Install License** to upload and install the license file.

If the license file is valid, TACTIC will display the message "License renewal completed"

Once this has been completed, TACTIC will no longer prompt for a valid license file.

## Renew License

To view information on the total users for the license and how many are active and to update the existing license file, in the sidebar, load **Site Admin -> Renew License**. From here you view the License statistics and update a new license file.



## Manual License Install

When the user interface tool is used to upload the license, TACTIC renames the file to tactic-license.xml and places it on the server under

```
<TACTIC_INSTALL_DIR>/project/config/tactic-license.xml
```

The XML file provided from the TACTIC representative can be renamed. After the rename, place the license on the server according to the structure outlined above and re-browse to tell TACTIC the new license name.

# Upgrade TACTIC

Upgrading TACTIC is usually a relatively simple procedure:

## Linux

1. Download the new release of TACTIC from the Download section of [support.southpawtech.com](http://support.southpawtech.com) . TACTIC is delivered as a zipped (.zip) file.
2. Copy the new version to the installed directory of TACTIC and unpack it. e.g.

```
cd /home/apache/
```

```
unzip tactic-2.6.0.v01.zip
```

3. Stop the TACTIC service

```
/etc/init.d/tactic stop
```

4. Switch the symbolic link. See explanation on symbolic link below.

5. In a cmd shell, cd to the bin directory of the new installation:

```
cd /home/apache/tactic/src/bin
```

6. Back up the current database:

```
pg_dumpall -U postgres -c > database_<date>.sql
```

7. Run the upgrade script. The version number argument (for example, 2.6.0.v01) is optional.

```
python upgrade_db.py
```

First, you will be prompted to confirm whether the displayed version is the right one to upgrade to.

On proceeding, it will check the upgrade script's version tree against the currently installed TACTIC version (the new one).

Normally, they should be the same. In case they are not, you will be prompted again to confirm if this is actually intended. Warning: if the versions do not match, it is very likely you have not stopped the old version from running or have not symlinked "tactic" to the new version yet.

8. Restart the TACTIC service:

```
/etc/init.d/tactic start
```

9. Go to the "Projects" view in the Admin site.

- 10.Optional: Compare each project's schema with the one used by TACTIC.

### Explanation of switching symbolic links

By default, in your python installation, like `/usr/lib/python2.5/site-packages/tacticenv/tactic_paths.py` it defines the `TACTIC_INSTALL_DIR = '/home/apache/tactic'` and so a convenient way to upgrade is to untar the new release in `/home/apache/` as e.g , `/home/apache/tactic-2.5.0.rc04` `cd /home/apache` then delete any existing symbolic link named "tactic" by running `rm tactic`. Afterwards, you can create a new symlink using `ln -s tactic-2.5.0.rc04 tactic` With

the tactic service stopped, and the TACTIC\_INSTALL\_DIR practically pointing to the new release because of the symlink, now you can safely run src/bin/upgrade\_db.py in the new release.

## Windows

1. Download the new release of TACTIC from the Download section of support.southpawtech.com . TACTIC is delivered as a zipped (.zip) file.
2. Copy the new version to the installed directory of TACTIC and unzip it.
3. Stop the TACTIC service

**Run services.msc**

**Select the service Tactic Server, click on the Stop button**

4. Rename the top directory of the new version to TACTIC.
5. In a cmd shell, cd to the bin directory of the new installation:

**cd C:\Program Files\Southpaw\Tactic\src\bin**

6. Back up the current database:

**pg\_dumpall -U postgres -c > database\_<date>.sql**

7. Run the upgrade script. The version number argument (for example, 2.6.0.v01) is optional.

**python upgrade\_db.py**

First, you will be prompted to confirm whether the displayed version is the right one to upgrade to.

On proceeding, it will check the upgrade script's version tree against the currently installed TACTIC version (the new one).

Normally, they should be the same. In case they are not, you will be prompted again to confirm if this is actually intended. Warning: if the versions do not match, it is very likely you have not stopped the old version from running or have not symlinked "tactic" to the new version yet.

8. Restart the TACTIC service:

**Select the service Tactic Server, click on the Start button**

9. Go to the "Projects" view in the Admin site.
10. Optional: Compare each project's schema with the one used by TACTIC.

## Multiple TACTIC Services

Multiple versions of TACTIC can be easily run side by side on the same machine. This is extremely useful for testing purposes. Running a newer version of TACTIC on a production server machine using the production server environment and production database. You can run this without interrupting service of the production server.

If this is not explicitly set, TACTIC will use whatever settings exist when TACTIC was first installed. These are defined in the `tacticenv` module which is first imported on all command line TACTIC scripts by:

```
import tacticenv
```

These values are typically found in the Python distribution site-packages. The exact location of these files can vary between differing operating systems, but common examples are:

```
windows: C:\Python27\site-packages\Lib\site-packages\tacticenv
```

```
linux: /usr/lib/python2.7/site-packages
```

When TACTIC starts up, it will first look at the environment variable `TACTIC_INSTALL_DIR` to determine which distribution of TACTIC will be used. Before a newer version of TACTIC is executed, it is necessary to upgrade to the newer database schema. Unless clearly stated in the distribution release, it is always safe to upgrade the database for a newer version. Changes to the database are always backwards compatible, so that older versions of TACTIC can always run on newer schema of the database.

## Steps

1. Unzip a TACTIC distribution anywhere in the file system. For purposes of examples, `/home/apache` will be used as the base directory for TACTIC

```
cd /home/apache
unzip tactic-3.0.0.zip
```

2. Set the environment variable `TACTIC_INSTALL_DIR`

```
export TACTIC_INSTALL_DIR=/home/apache/tactic-3.0.0
```

3. Upgrade the database.

```
su apache
cd tactic-3.0.0.src/bin
python upgrade.py
```

4. Execute tactic

```
python startup_dev.py
```

This will execute TACTIC from the command line in dev mode. All output will go to this console.



# Install Python

## Python Installation

### Overview

Python is a core element of the TACTIC application. The TACTIC application has been developed around the the python programming language.

The installations of both python and supporting modules is a requirement in a successful installation of TACTIC. Although the TACTIC core files can exist on the host machine, it is the existence of both Python and the supporting modules.

### Python Version

Python 2.5 is the defacto standard for deployments of the TACTIC application. 2.6 and 2.7 are supported as well. Currently, Python 3.0 is unsupported.

### TACTIC Python Supporting Modules

The installation of core Python is not enough for the successful installation of TACTIC. Several modules must be installed. These modules provide the following functions:

- Extensive **XML support**
- Connectivity to **DB co-service**
- **Win32** support on windows
- **Cryptography** support
- **JSON** support
- Imaging support

The TACTIC application can support different different Python Supporting Modules, depending on the version of TACTIC.

There are a number of variables that will affect which modules will be required to install on a host machine. These considerations are;

- DB Co-service deployed
- Desired support module deployed when multiple support module types exist.

**Table 5.**

Support Module Type	Module name	TACTIC supported version
XML support	lxml	All
DB Co-Service Support	Psycopg2 or CX-Oracle (psycopg2 is preferred for postgres database set-up)	All
Win32 (used in client computers interacting with the server)	PyWin32	All
Cryptography	PyCrypto	All
JSON (not needed since Python 2.6)	SimpleJSON	All
Imaging	PIL and ImageMagick (optional)	All

## Installation on Windows

On Windows systems, TACTIC Python and supporting module availability is through the websites of the supporting module projects. Additionally, Southpaw Technology supports redistribution of installers for these modules on the support web site.

## Installation on UNIX/Linux

On UNIX/Linux systems, the system package manager typically has options for installing all the required Python packages onto the UNIX host machine. To find the official distribution of a supporting package, the search functionality of a package manager is useful.

```
#/ yum search lxml
```

# Install Web Server

## HTTP Co-Service Installation/Configuration

The aim of this document is to be able to configure Apache to proxy TACTIC on a UNIX machine. For Apache on Windows machines, there may be some slight differences in behavior or steps.

### Requirements:

1. User must have sufficient technical knowledge to navigate the OS directories, edit text files, and start/stop services. Knowledge of the target web server is required.
2. TACTIC must be installed on the host machine. It should be runnable to the point where all diagnostics presume no error in the TACTIC configuration. In the below examples, TACTIC is installed with all default options.
3. The web server must be installed on the host machine. Since different OS's can have vastly different HTTP service default configurations, configuration files will need to be found by command or appropriate documentation consultation.

### Prerequisites

The TACTIC host machine should have the following prerequisites

- A working TACTIC installation

- An OS capable of running the target HTTP co-service

## **HTTP server assumptions**

The HTTP configuration assumes that the main server is being used to proxy TACTIC requests, without SSL or virtual servers. TACTIC requires that the appropriate modules or 3rd party modules are activated.

## **TACTIC configuration assumptions**

This document assumes that TACTIC has been configured correctly and is functioning as expected. It is assumed that TACTIC is installed with default ports 8081 through 8083. This is the typical default TACTIC configuration.

# Apache HTTP Co-Service Configuration

## Installation

Installation of Apache can be done through any number of means, depending on the software package on hand, and the target OS used. Please consult the Apache documentation for installation information.

## Configuration

All steps require use of a command shell. The example posted below is working as root user, but some OS's are not enabled for root user access. The root user may have to be enabled on the target machine, otherwise commands must be prepended with "sudo", or whatever method required for editing service files, starting and stopping services, etc.

## Locate the httpd.conf file

The httpd.conf file (sometimes alternatively, the apache2.conf file) is the configuration file for Apache. Locate this file on the target machine. For purposes of this illustration, the httpd.conf file name will be used.

```
leowiz:~ root# locate httpd.conf
/private/etc/apache2/httpd.conf
/private/etc/apache2/original/httpd.conf
leowiz:~ root#
```

Alternatively "find" will do the same thing;

```
leowiz:~ root# find / -name httpd.conf
/private/etc/apache2/httpd.conf
/private/etc/apache2/original/httpd.conf
leowiz:~ root#
```

In this case, the "/private/etc/apache2/httpd.conf" file is the one we are interested in.

## Include the TACTIC configuration file in Apache

For isolation of configuration options for editing purposes, the TACTIC configuration file is a single file which should be referred to by the Apache configuration file. In this case, the default "tactic.conf" file will be used. The file is included at the end of this document.

Find out if the httpd.conf file has an "Include" statement that refers to a directory the TACTIC Apache configuration file can be put in.

```
leowiz:~ root# grep Include /private/etc/apache2/httpd.conf
Include /private/etc/apache2/extra/httpd-mpm.conf
#Include /private/etc/apache2/extra/httpd-default.conf
#Include /private/etc/apache2/extra/httpd-ssl.conf
Include /private/etc/apache2/other/*.conf
leowiz:~ root#
```

In this case, the line at the bottom is the one that is required;

```
Include /private/etc/apache2/other/*.conf
```

If there is no such include, then a line can be added to the httpd.conf file.

In the above example, there is a reference to a directory wild-card configuration inclusion. Essentially then, any files with the suffix ".conf" will be activated. This is where the TACTIC configuration file will be stored. Either the default configuration file can be used with some editing, due to the variations in location of the TACTIC service application.

## Instruct Apache to proxy static files

For purposes of efficiency, Apache will proxy files that are static. In the tactic.conf file, there are 2 major directives that are of concern regarding directory access. There is the directives that enable the TACTIC GUI widgets to work,

```
<Directory "/home/apache/tactic" >
  Options FollowSymLinks
  AllowOverride None
  Order Allow,Deny
  Allow from All
</Directory>
```

The second set is:

```
<Directory "/home/apache/assets" >
  Options FollowSymLinks
  AllowOverride None
  Order Allow,Deny
  Allow from All
</Directory>
```

In the default example, the TACTIC application is stored at "/home/apache/tactic" while the assets are stored at "/home/apache/assets" The directives here allow Apache access to proxy these file locations for TACTIC.

## Instruct Apache to rewrite the "/tactic" URL subpath

Since Apache is serving only static files, it can be configured to serve the dynamic content served by TACTIC using a proxy.

To enable the Apache proxy service, the tactic.conf file must contain directives that enable the proxy and rewrite modules to serve the TACTIC service.

```
ProxyPreserveHost on
RewriteEngine on

# for cherrypy
RewriteRule ^/tactic/(.+$) http://localhost:8081/tactic/$1 [P,L]
RewriteRule ^/tactic http://localhost:8081/tactic/ [P,L]
RewriteRule ^/projects/(.+$) http://localhost:8081/tactic/$1 [P,L]
RewriteRule ^/projects http://localhost:8081/tactic/ [P,L]
```

In this example, the TACTIC service is located on the same machine, on port 8081. All URL requests that have a "/"tactic" or "/projects" in the URL will be redirected to the TACTIC service, which by default is on port 8081.

To effectively use load-balancing on this machine, replace it with the following configuration instead:

```
# This is for using a random load_balancing scheme
RewriteMap lb rnd:/home/apache/sites/load_balance.txt
RewriteRule ^/tactic/(.+) $ http://${lb:dynamic}/tactic/$1 [P,L]
RewriteRule ^/projects/(.+) $ http://${lb:dynamic}/tactic/$1 [P,L]
RewriteRule ^/tactic http://${lb:dynamic}/tactic/ [P,L]
RewriteRule ^/projects http://${lb:dynamic}/tactic/ [P,L]
```

The file, /home/apache/sites/load\_balance.txt contains

```
lb localhost:8081|localhost:8082|localhost:8083
```

The Apache configuration files have now been modified to proxy and rewrite TACTIC requests.

## Restart the Apache Service

Apache needs to be restarted for the configuration changes to take effect. Most Apache installations have a "apachectl" command. To restart apache, use;

**apachectl restart**

Once Apache has been restarted, it should be serving TACTIC requests.

## Conclusion

At this point Apache should be configured to proxy TACTIC service requests to the TACTIC service, while leaving all other requests to Apache itself.

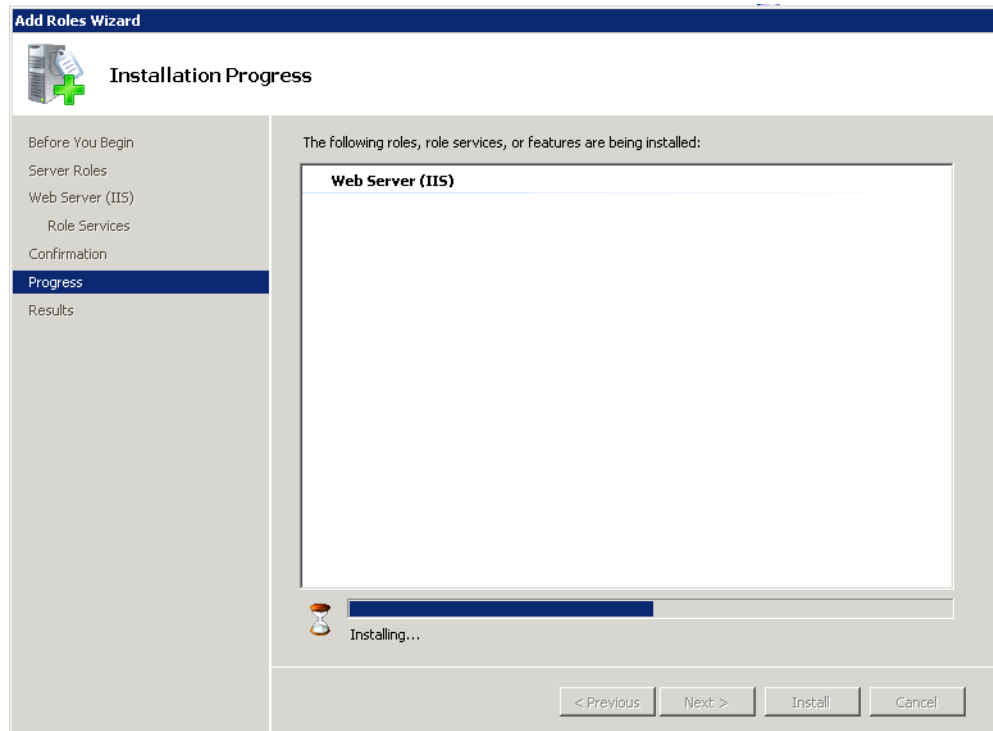
## IIS 7+ HTTP Co-Service Configuration

### Installation

Windows HTTP co-service installations are IIS based.

On IIS installations prior to version 7, appropriate 3rd party proxying software (the ISAPI\_Rewrite module) is required to be installed with IIS to enable the proper functioning of TACTIC.

TACTIC can be configured to work with the native IIS 7.5 services available on applicable Windows OS's, such as Windows 7 and Windows Server 2008. Prior versions of IIS have required 3rd party software (the ISAPI\_Rewrite module) to be installed alongside the IIS service to facilitate proxy and URL rewriting. With IIS 7.5, and the introduction of the ARR and URL rewrite module, the requirement of a 3rd party software is no longer needed.



On Windows 7, and Windows Server 2008, IIS is installed through means and directions published on Microsoft support websites. Please consult installation guides published by Microsoft for the installation procedure of IIS.

Typically, IIS 7.5 does not come with the ARR module, and depending on the IIS installation, URL rewrite. These modules are requirements for a installation alongside TACTIC. Please refer to Microsoft published documentation regarding installation of these modules.

## Configuration

# Permissions

Permissions must be set for IIS to be able to serve assets that TACTIC manages.

TACTIC requires that the IIS user have access to TACTIC assets and all of the virtual directories that contain TACTIC widgets.

## The "TACTIC" user

Whether the assets directory is stored on the host machine or on a network mount, there should be a assigned user that runs TACTIC.

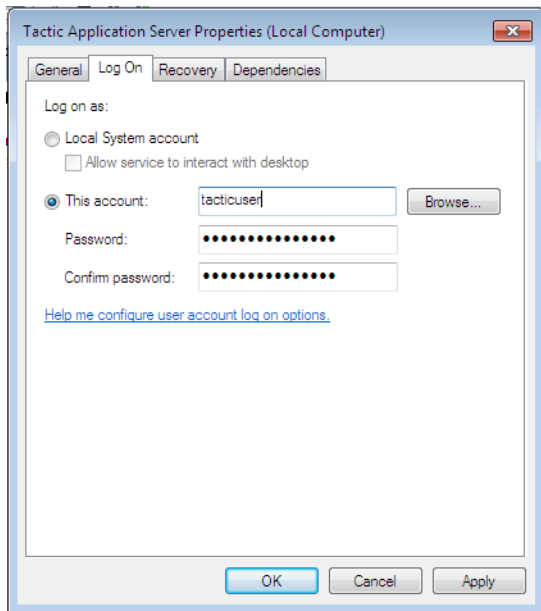
For non-domain Windows machines, a local user created on the TACTIC host, such as the IUSR\_<computer\_name> automatically created by an IIS installation will suffice, provided that the network mounted directories are writable by the system user.

For ADS domains, a user can be created on the domain, and assigned via the Services control panel. Assigning a domain user to the TACTIC service will allow domain level security rules to apply.

### To assign a user to a service:

1. Open the Services control panel

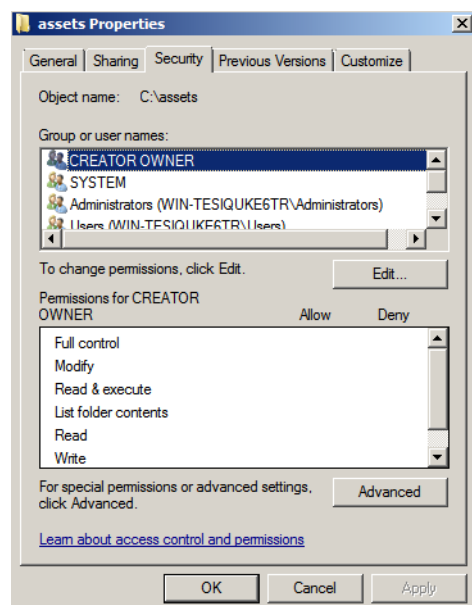
2. Right click on the "TACTIC application server"
3. Click on the "Log On" tab
4. Change the "log on as" option to reflect the user created, whether local or domain based.



## Setting permissions on directories

For a locally hosted asset directory, the anonymous user (typically IUSR\_<computer name>) account needs to be granted access to the directories, and all subdirectories under them.

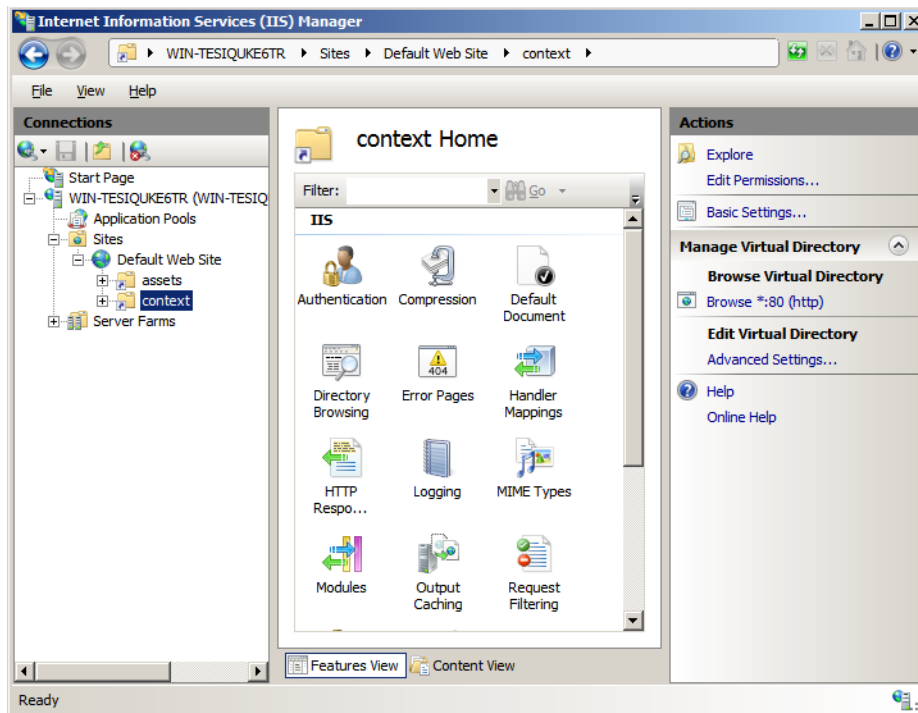
Find the directories above in Windows Explorer, and right click on the directory to bring up "Sharing and Security#?" for that directory.





# Virtual Directories

IIS must be configured to serve static content, such as TACTIC assets, and TACTIC UI skins.



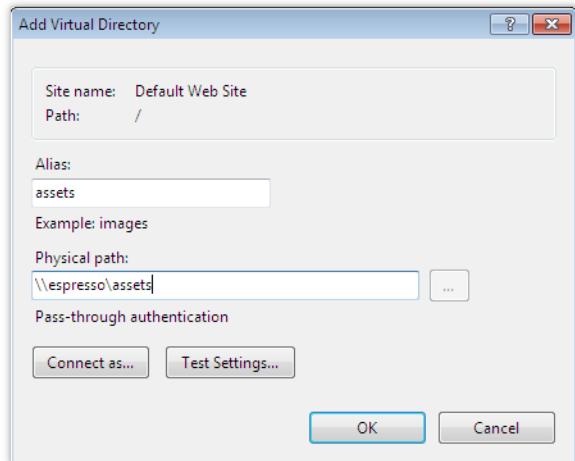
**Table 6. Virtual directories required by TACTIC**

Directory Description	Directory Alias	Location
Assets storage	assets	User provided during installation
TACTIC UI widgets	context	Inside TACTIC installation directory
Documentation	doc	Inside TACTIC installation directory
Project storage	projects	User provided during installation

There are four “virtual directories” that must be created to access the static content provided by TACTIC.

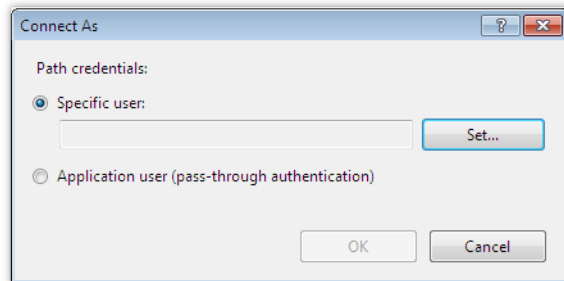
## To create the directories;

1. Right click on “Default web site” and “Add Virtual Directory”
2. Create the virtual directory, using the paths that were created by the installation of TACTIC. The default paths may not apply.

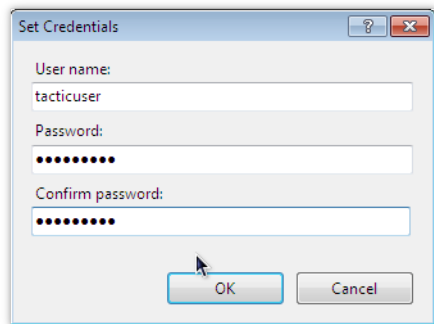


### 3. Important

If the directory is located on a network mount, it may have to be connected to as the user running the TACTIC service. To connect as a different user than the IIS user, click on the "Connect As"

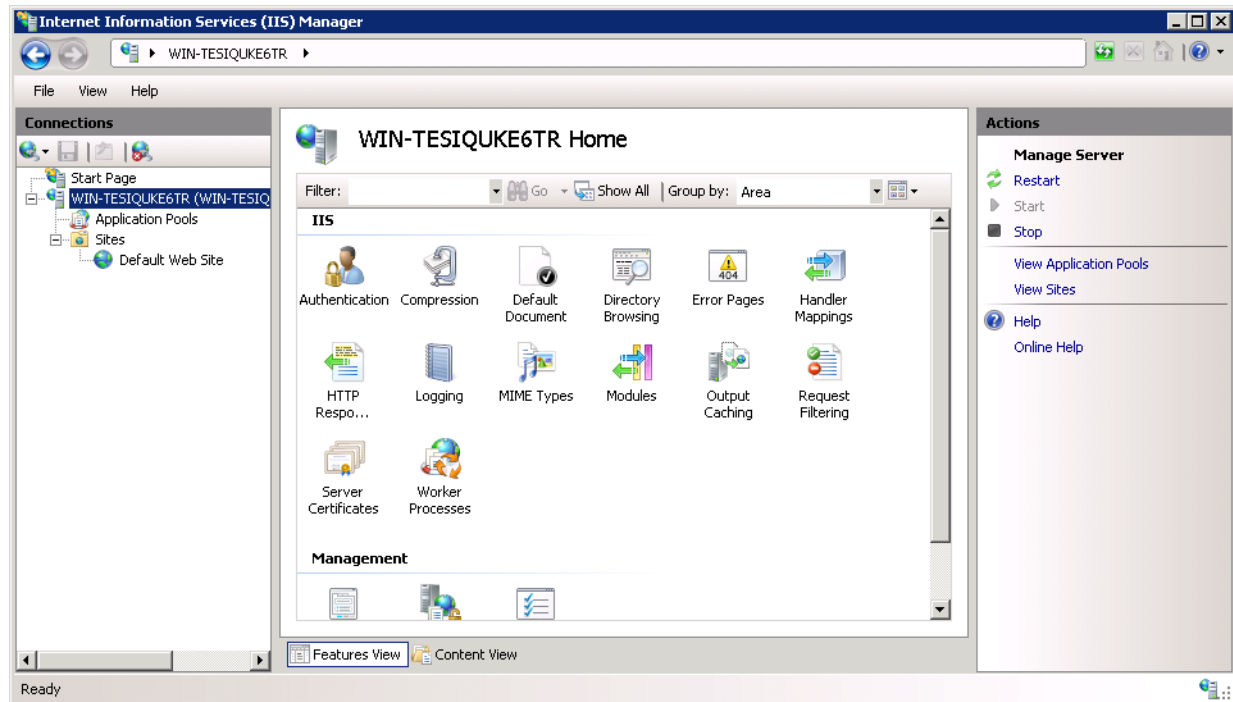


Then click on the "Set..." button, and fill in the details of the user that will run the TACTIC service.



There should now be 4 virtual entries on the IIS service.

# Application request routing (ARR)



Application Request Routing (ARR) is the module snap-in that will proxy and load balance requests. ARR is required by IIS to split incoming TACTIC service requests between the dynamic content that drives the API and the TACTIC web UI, and static content. In order to achieve this, IIS must be configured to send certain requests to the TACTIC application server, while static data requests (usually assets) are sent to IIS.

## Proxy and Load Balancing through ARR

This guide currently supports two methods of attaching the TACTIC service to an IIS co-service.

### Proxy/Load balancing

The Load balancing configuration of IIS splits TACTIC service requests into multiple streams, with each stream utilizing its own TACTIC service process.

### Proxy Only

The proxy-only configuration routes all TACTIC service requests to a single TACTIC service. This method should only be used in light usage TACTIC installations such as development servers.

## Proxy/Load balancing configuration

A TACTIC installation by default runs 3 separate TACTIC service listeners, arranged on default ports 8081, 8082 and 8083. To split TACTIC service requests into multiple streams, IIS must be configured to consider TACTIC part of a “server farm?”. Since all of the TACTIC services are running on one single host, IIS currently must be tricked into routing requests to the 3 different TACTIC streams on the localhost.

By default, windows looks in the hosts file, then to DNS for named hosts. To divide localhost into three “different” machines, the “%SYSTEMROOT%/System32/drivers/etc/hosts” file must be edited to be able to address localhost as more than one machine.



## Important

If TACTIC is set to run a number of processes other than the default of three, then these instructions must reflect that number. Add or subtract from the list of localhost entries and web farm entries accordingly.

### To create a web farm;

1. As an “Administrator” user, edit the “127.0.0.1” line in this file

```

# Copyright (c) 1993-2009 Microsoft Corp.
#
# This is a sample HOSTS file used by Microsoft TCP/IP for Windows.
#
# This file contains the mappings of IP addresses to host names. Each
# entry should be kept on an individual line. The IP address should
# be placed in the first column followed by the corresponding host name.
# The IP address and the host name should be separated by at least one
# space.
#
# Additionally, comments (such as these) may be inserted on individual
# lines or following the machine name denoted by a '#' symbol.
#
# For example:
#
#       102.54.94.97       rhino.acme.com   # source server
#       38.25.63.10      x.acme.com       # x client host
#
# localhost name resolution is handled within DNS itself.
#       127.0.0.1        localhost localhost-2 localhost-3
#       ::1              localhost

```

The addition of localhost-2 and localhost-3 that reference 127.0.0.1 allow this host machine to access localhost as more than one machine.

2. Now the Server Farm reference must be created.

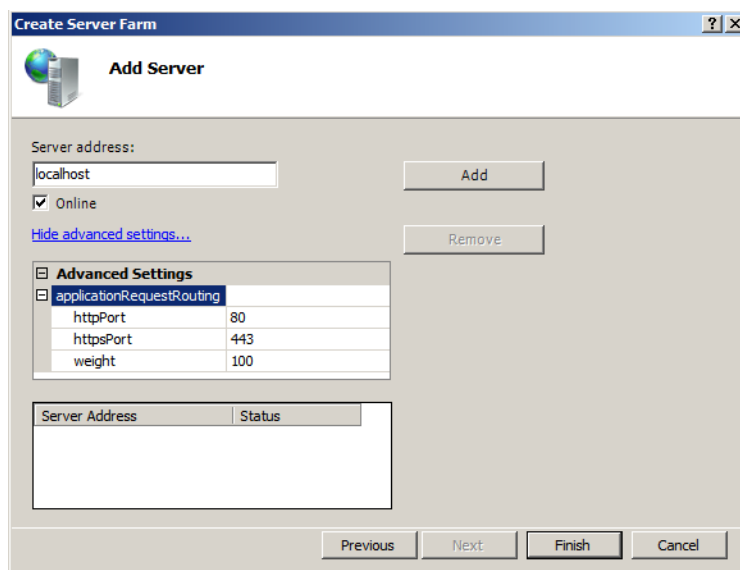
Start the IIS snap in, and select the Web server that will be used as a TACTIC co-service in the left side navigation bar. Right click on the “Server Farms” folder and create a new server farm.

3 separate servers must be added to the server farm to correspond to the 3 default TACTIC service processes. Add each server according to the below table.

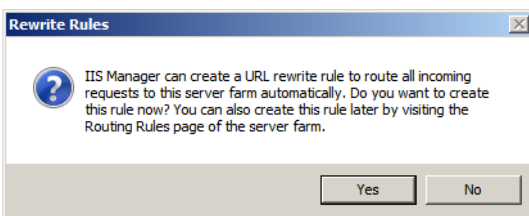
**Table 7.**

Server Address	httpPort
localhost-1	8081
localhost-2	8082
localhost-3	8083

Click on “Add” when done each entry in the above list. For additional servers, the “server address” must correspond to the additional localhost entries in the “hosts” file. The ports must correspond to 8082, 8083, etc. Add the required number of servers according to TACTIC deployment requirements.



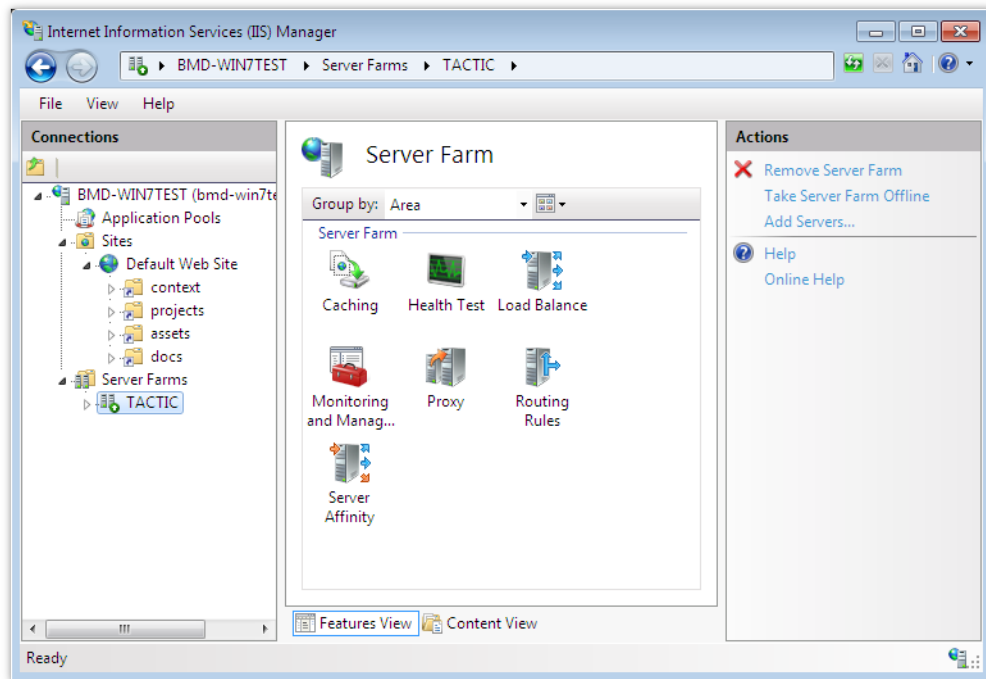
3. Click “Finish” when done.
4. Create the rewrite rule when prompted.



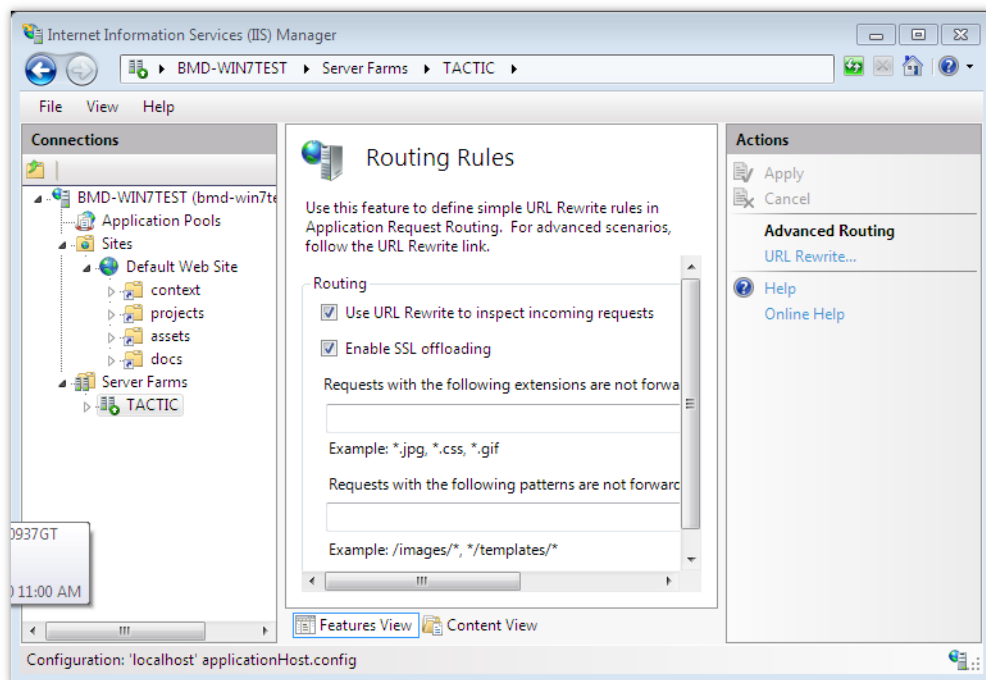
## URL rewrite configuration

URL rewrite must now be configured to only send TACTIC API requests to the server farm.

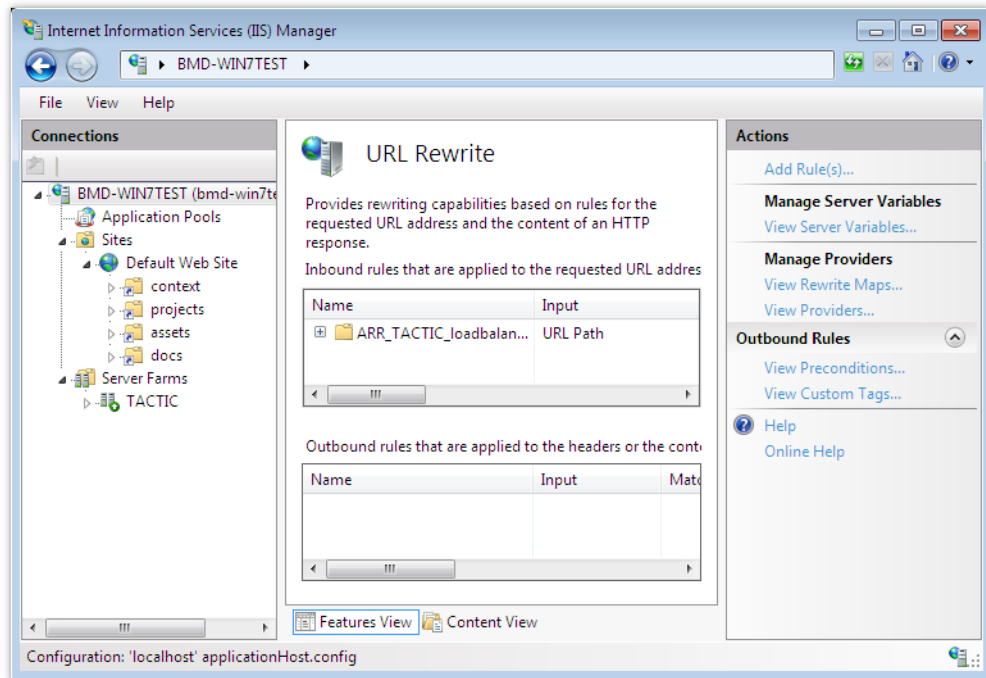
1. Click on the server farm icon on the left-hand side of IIS manager and click the “Routing Rules” icon.

**Figure 1. Selection\_009.png**

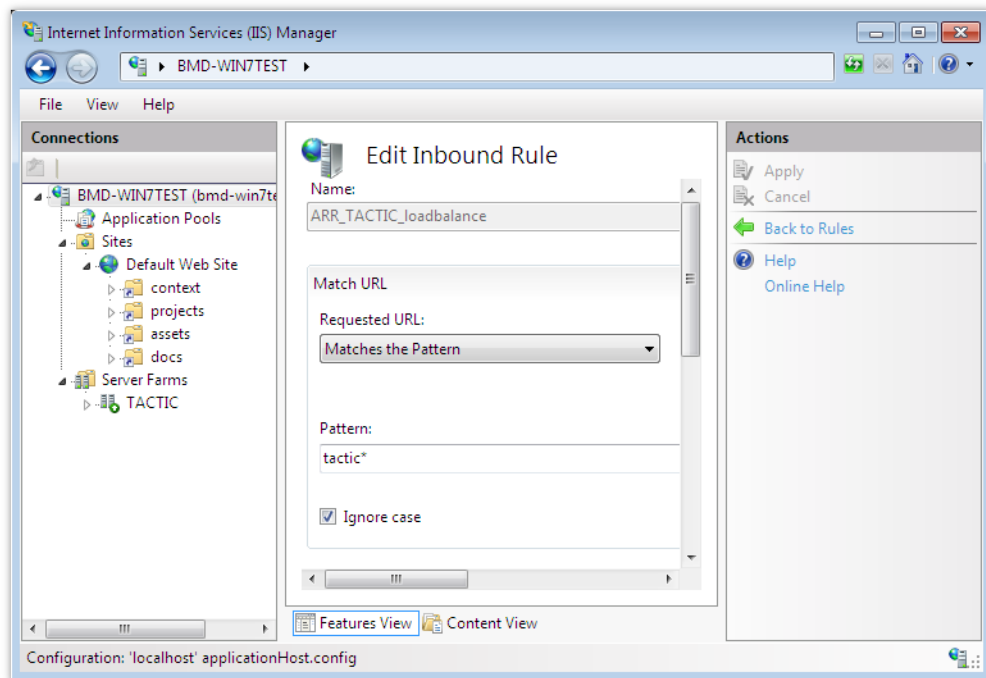
2. In the right pane of the Routing rules section, click the "URL rewrite" link



3. Select the automatically created URL rewrite rule created when the web farm was created, and click on the "Edit" link in the right pane.



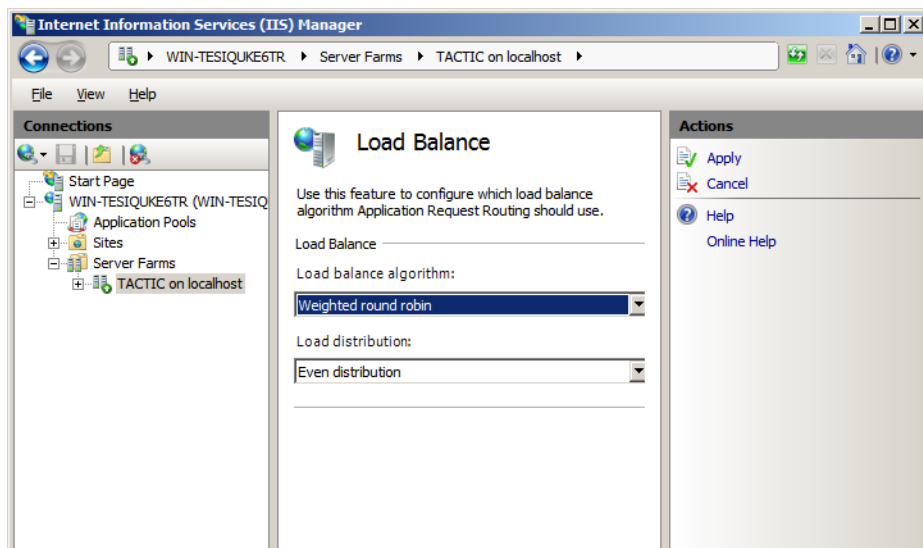
In the “Edit Inbound rule#?” pane, edit the pattern to read “tactic\*.projects\*#?”. This will instruct IIS to route all TACTIC UI requests to the TACTIC service.



4. Apply the change.

# Load Balancing Algorithms

ARR comes with several load balancing algorithms. Click on the newly created server farm, and click on the “Load Balancing” icon. Select “Weighted round robin” as the algorithm, and “Even distribution” as the load distribution.

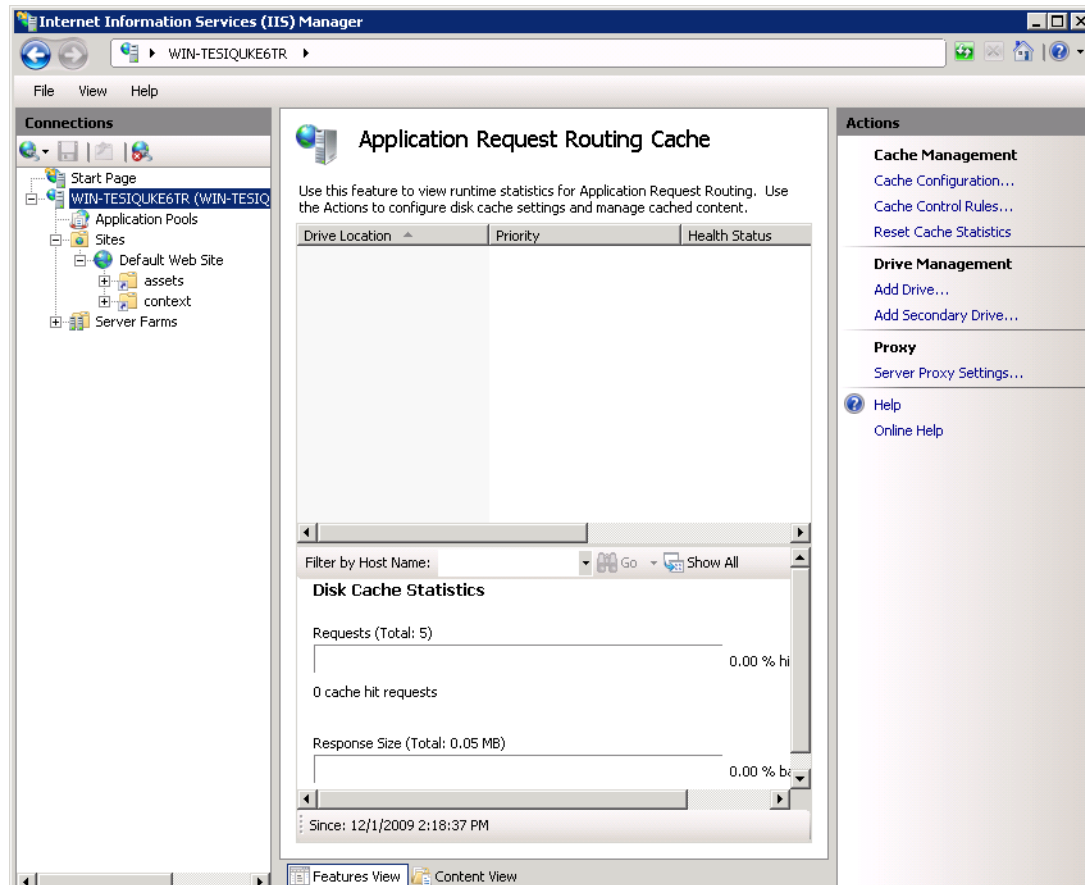


## Proxy Only

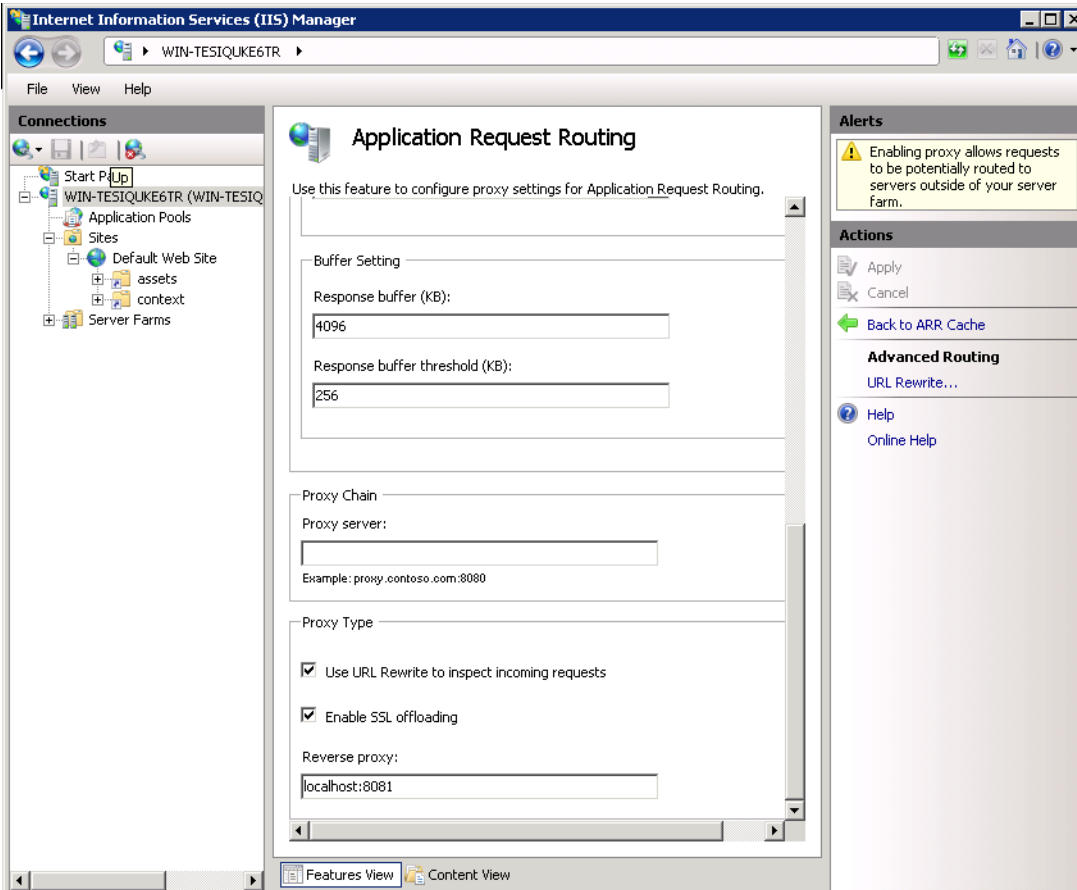
IIS can be configured to run a single rewrite rule to forward requests to a single TACTIC service.

Start the IIS snap in, and select the Web server that will be used as a TACTIC co-service in the left side navigation bar. Choose “Application request routing” and click on server proxy settings on the right-hand side.

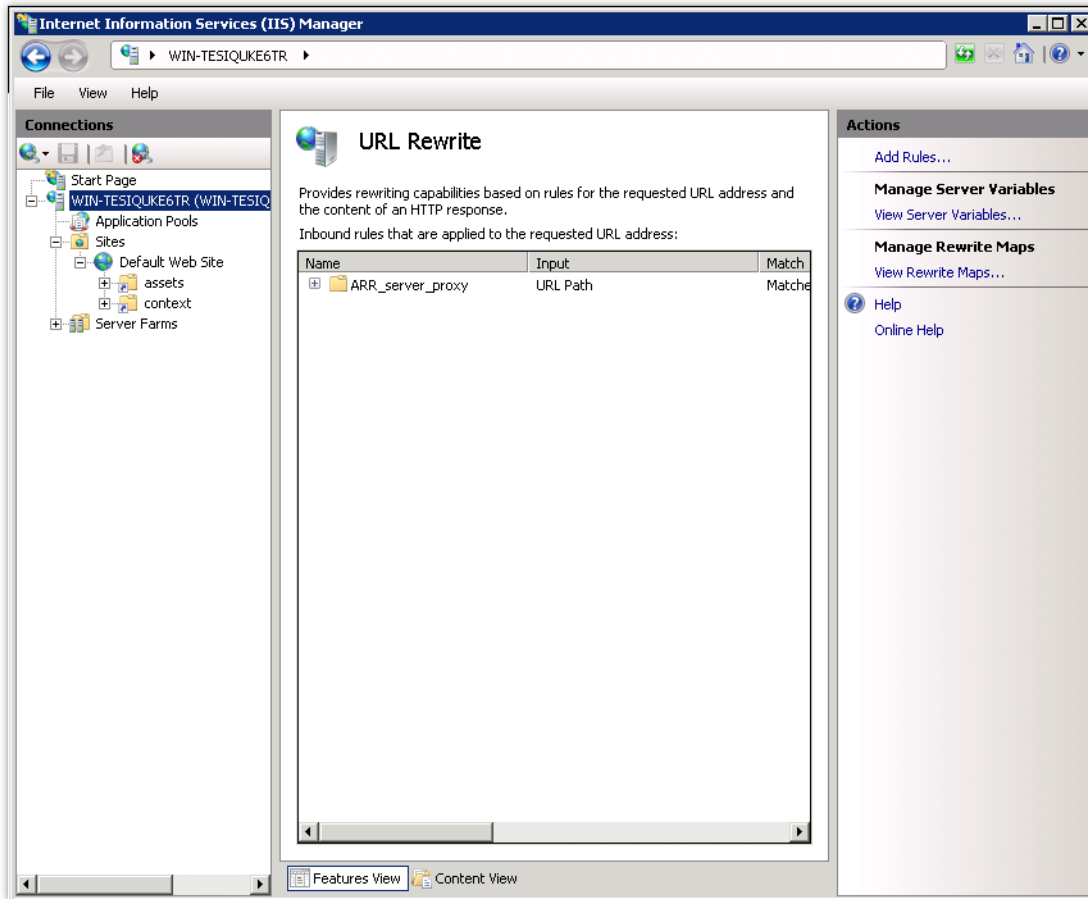




In the ARR options under the proxy settings check the “use URL rewrite to inspect incoming requests#?”, And in the “reverse proxy#?” text area type “localhost:8081#?”. This instructs IIS to proxy everything to this address and port.

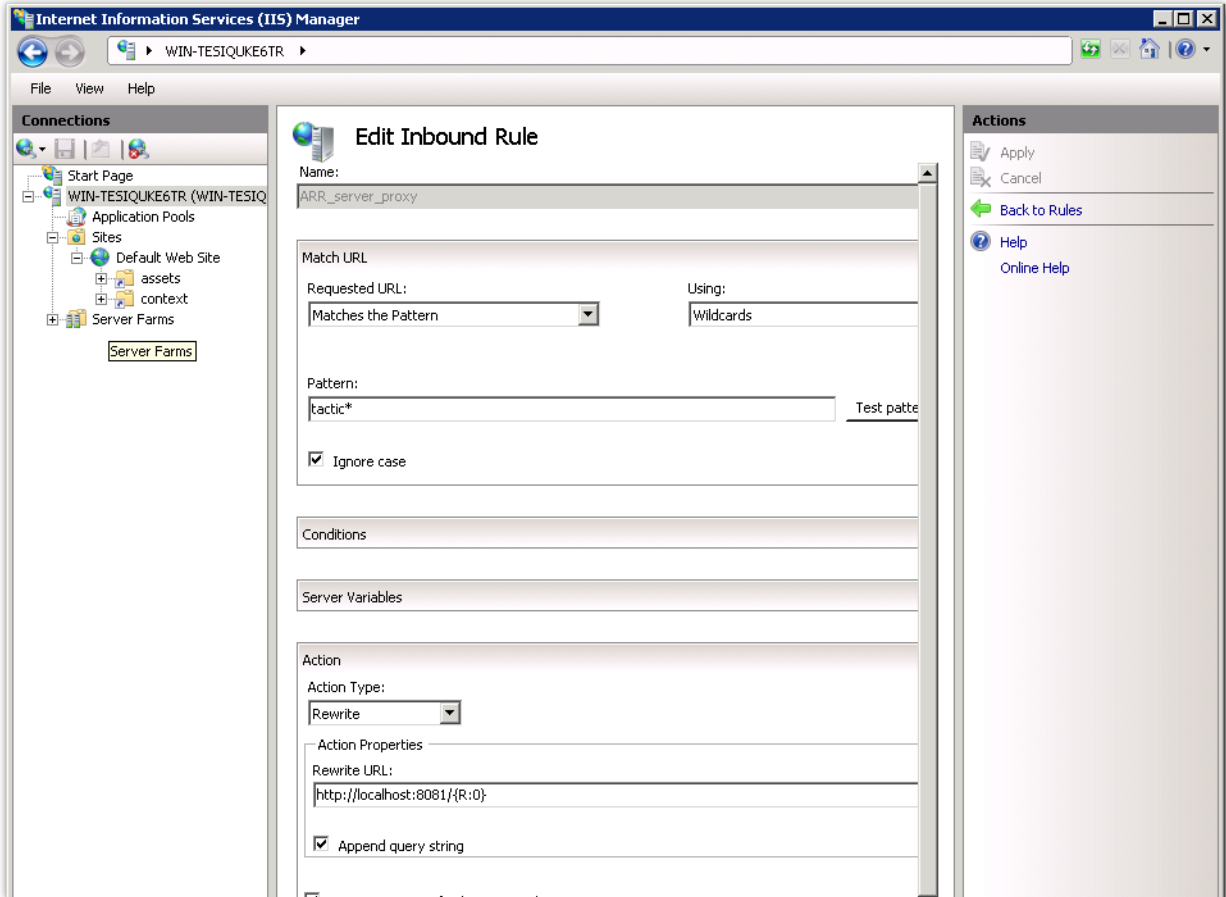


From here URL Rewrite can then be instructed to filter proxy requests. Click on the “URL rewrite#?” link on the right-hand side to modify rewrite rules. Typically, if the proxy has been created in ARR, then a rule will be created in URL rewrite.



## Modifying the Rewrite rules

IIS must then be instructed to only proxy TACTIC UI and API requests. To do this, an automatically created rule must be altered to allow TACTIC asset requests to be handled by IIS.



To modify the existing rule for TACTIC, the pattern under "Match URL" should be "tactic\*". The action "Rewrite URL#?" should be "http://localhost:8081/{R:0}"

## Custom/Other Settings

### MIME types

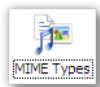
TACTIC currently has a requirement to insert custom MIME types into the list of allowed types for the IIS service.

**Table 8.**

MIME type	Function	Extension
text/plain	Python Script mask	.xx

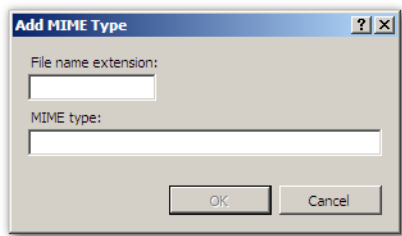
To add a MIME type in IIS 7

1. Click on the web server entry in the left-hand pane.
- 2.



Click on the MIME types icon in the centre pane.

3. Click on the "Add..." link on the right-hand pane.
4. Add all entries required by the table above.



## Conclusion

At this point IIS should be configured to proxy TACTIC service requests to the TACTIC service, while leaving all other requests to IIS.

## Resources

<http://learn.iis.net/page.aspx/485/define-and-configure-an-application-request-routing-server-farm/>

<http://learn.iis.net/page.aspx/486/http-load-balancing-using-application-request-routing/>

<http://blogs.msdn.com/nickhodge/default.aspx?p=2>

# Install Database

## TACTIC Database Configuration

By default TACTIC will look at localhost to the database. This is the simplest implementation and most installations will have the database on the same physical server as the TACTIC application servers. However, in scaling up TACTIC, it may become necessary to separate the database server from the TACTIC applications servers.

TACTIC can be configured to look at an external database by connecting through sockets of TCP/IP. This can be set in the TACTIC configuration file.

While it is possible to edit this file manually, it is often simpler to use the provided utility found in: `<TACTIC_INSTALL_DIR>/src/bin/util/change_db_info.py`

This command line script will ask a series of questions and update the appropriate configuration file

### Usage:

```
python change_db_info.py
```

When executing, the script will ask configuration questions and show a default value in brackets. If the default is sufficient, merely press enter without entering anything in will accept the default.

Below is a sample output where all the default values are accepted:

### TACTIC Database Configuration

Please enter the database vendor (PostgreSQL or Oracle):

(PostgreSQL) ->

Please enter database server hostname or IP address:

(localhost) ->

Please enter user name accessing the database:

(postgres) ->

Please enter database password:

(ENTER to keep password, '\_\_EMPTY\_\_' for empty password)

Enter Password ->

Vendor: [PostgreSQL]

Server: [localhost]

User: [postgres]

Save to config (N/y) ->

Once the values have been saved, a restart of TACTIC is required to start using the new database configuration.

# Server Configuration

## Configuring TACTIC and Co-Services

### TACTIC Service Configuration

#### Overview

Multiple TACTIC servers can be leveraged in environments where there is heavy report analysis, and where custom TACTIC environments are making heavy use of API and GUI calls. To spread out the load of the requests made, custom API scripts can be run on one TACTIC server, while another TACTIC server can be used to serve GUI requests. The only consideration then with multiple TACTIC machines will be where the database and the asset directories.

#### Database

TACTIC needs to know where to find assets and asset metadata. To do this, each installation of TACTIC must be able to have direct file system access to assets storage, and network access to the database co-service.

tactic\_(os).conf

needs to contain this information.

```
<database>  
<server>[DB server IP]</server>  
</database>
```

All other settings, covered previously, can be set according to individual requirements of the host machine and environment.

#### Assets Storage

TACTIC needs to know where to find assets. To do this, each installation of TACTIC must be able to have direct file system access to assets storage. The details of file system management are beyond the scope of this document, but typically are within the realm of the system administrator.

#### Processes

If the TACTIC server has no other services attached, there is probably room to increase the number of processes running on each machine.

```
<services>  
<process_count>6</process_count>  
</services>
```

Refer to Reference: TACTIC Default Configuration for the complete sample configuration file.

Refer to Reference: TACTIC Service Configuration Directives for configuration directives.

### HTTP Co-service Configuration

#### Apache

Apache is used for the following sample HTTP configuration for TACTIC. Some configuration knowledge of apache is required.

## Permissions – Allowing TACTIC to store and manipulate assets

This section defines the location and availability of the assets directory, which is the primary source of data for the apache server. There is also the declaration of an alias to the TACTIC source directory, which contains various objects that TACTIC uses, such as widget elements.

```
Alias /context /home/apache/tactic/src/context
Alias /assets /home/apache/assets
Alias /doc/ /home/apache/tactic/doc/
```

The section with <Directory> directives defines the access rules for the assets directory and the "/tactic" directory, which is just a conveniently named alias.

```
<Directory "/home/apache/tactic" >
    Options FollowSymLinks
    AllowOverride None
    Order Allow,Deny
    Allow from All
</Directory>
<Directory "/home/apache/assets" >
    Options FollowSymLinks
    AllowOverride None
    Order Allow,Deny
    Allow from All
</Directory>
```

## Proxying/Rewriting a single process – Redirecting requests to TACTIC

Apache needs to know where to find the proxied TACTIC service in the httpd.conf file. The below configuration takes advantage of only one process being served from port 8081 on the local machine.

The second section, with RewriteRule directives, defines the re-write rules for the TACTIC service, to segregate requests handled by the TACTIC server, from static asset delivery through the HTTP service. These rules channel any requests that are prefixed with the "/tactic" path to the TACTIC server on port 8081.

```
RewriteRule ^/tactic/(.+) $ http://localhost:8081/tactic/$1 [P,L]
RewriteRule ^/tactic $ http://localhost:8081/tactic/ [P,L]
RewriteRule ^/projects/(.+) $ http://localhost:8081/tactic/$1 [P,L]
RewriteRule ^/projects $ http://localhost:8081/tactic/ [P,L]
```

## Proxying/Rewriting multiple processes – Redirecting requests to TACTIC

The proxy configuration can be enhanced with a load balancing scheme for one or more machines. Apache has the ability to randomly select from a list of locations via a rewrite map.

```
RewriteMap lb rnd:/home/apache/sites/load_balance.txt
```

This map can feed the rewrite rules with a dynamically assigned host name.

```
RewriteRule ^/tactic/(.+) $ http://${lb:dynamic}/tactic/$1 [P,L]
RewriteRule ^/projects/(.+) $ http://${lb:dynamic}/tactic/$1 [P,L]
RewriteRule ^/tactic $ http://${lb:dynamic}/tactic/ [P,L]
RewriteRule ^/projects $ http://${lb:dynamic}/tactic/ [P,L]
```

The file load\_balance.txt is an arbitrarily named and located file that contains the names of servers that will be referred to by the "rnd" function in the Rewrite rules. The "lb:dynamic" reference will be replaced by the name of the server file

The load\_balance.txt contains a pipe separated list of hosts named "dynamic"



```
dynamic localhost:8081|localhost:8082|localhost:8083
```

This list is dependent on the number of ports that TACTIC is running on, specified by `tactic_(OS).conf`. Note that apache can proxy from IP addresses or hostnames external to the host that the service is parked on.

On this single line list, add all machines and ports that are running TACTIC. Since the scheme algorithm is random, it does not matter what order the machines/ports are listed in, just that they are actually on the list. In this case, there are multiple TACTIC machines, named "tacticserver01" and "tacticserver02". The example assumes the machine has either DNS entries for these machines or entries in the "hosts" file. IP addresses can also be used.

```
dynamic tacticserver01:8081|tacticserver02:8081|tacticserver01:8082
# and so on, until all machines/ports are covered
```

Refer to Reference: Apache Configuration for TACTIC for the complete sample configuration file.

## Database Co-service Configuration

### PostgreSQL

PostgreSQL is used as the database co-service in the following sample configuration. PostgreSQL has only two configuration files that are required to be examined in order to function with TACTIC; `pg_hba.conf` and `postgresql.conf`

#### Network trust - pg\_hba.conf

The `pg_hba.conf` configuration file contains a list of users and hosts with clearance levels. In the default `pg_hba.conf` file that comes with TACTIC, the network trust level is set for the most open access by the localhost;

```
# TYPE  DATABASE  USER  CIDR-ADDRESS  METHOD
local   all      all   trust
# IPv4 local connections:
host    all      all   127.0.0.1/32   trust
# IPv6 local connections:
host    all      all   ::1/128        trust
```

In this example, all local connections to PostgreSQL are trusted. This configuration matches the correct configuration required by a single machine.

```
host    all      all   <TACTIC_HOST_IP_ADDR>   trust
```

#### Network interface - postgresql.conf.

The `postgresql.conf` configuration file has a setting that will allow the PostgreSQL service to bind to the particular interface required.

Of concern is the "listen\_addresses" attribute.

```
listen_addresses = 'localhost'
```

By default, the PostgreSQL service is only bound to the localhost. This is fine for single machine operation of the TACTIC service.

```
listen_addresses = '*'
```

This setting or specific IP addresses can be used if the DB service is not on the same machine as the TACTIC service

## Configuration File

The TACTIC `config` file stores settings such as directory locations and email server information.

The name of the TACTIC config file and the location can be found here:

Filename	Operating System	Location
tactic-conf.xml	Windows or Linux	<TACTIC_DATA_DIR>/config

note: Prior to TACTIC 3.8, the TACTIC config file is named differently for each operating system. See the table below:

Filename	Operating System	Location
tactic_win32-conf.xml	Windows	<TACTIC_INSTALL_DIR>/project/config
tactic_linux-conf.xml	Linux	<TACTIC_INSTALL_DIR>/project/config

For Windows, the <TACTIC\_DATA\_DIR> is C:\ProgramData\Tactic\data by default.

Otherwise, <TACTIC\_INSTALL\_DIR> is usually /home/apache by default on a Linux machine. Southpaw supplies the TACTIC config file as a template on installation. Once installed, this file can be modified to reflect any of the options described in the sections below. If an option tag does not exist in a particular section in your config file, TACTIC will assume a default or it can simply be added in.

## Install

This section defines the hostname for the server (if different from "localhost") as well as the temp directory to be used for TACTIC. The tmp\_dir is where temporary files are stored as well as the TACTIC log files.

```
<install>
  <hostname>localhost</hostname>
  <tmp_dir>/home/apache/tactic_temp</tmp_dir>
</install>
```

<b>hostname</b>	This section defines the hostname for the server (if different from "localhost"). The hostname is what TACTIC listens to.
<b>tmp_dir</b>	The temp directory to be used by TACTIC.

## Services

This section defines information regarding the services external to TACTIC.

```
<services>
  <mailserver>smtp8.sympatico.ca</mailserver>
  <mail_user>some_username</mail_user>
  <mail_password>some_password</mail_password>
  <mail_port>a port number other than 25</mail_port>
  <mail_sender_disabled>true</mail_sender_disabled>
  <mail_tls_enabled>true</mail_tls_enabled>
  <python>python</python>
  <python_path>/home/apache/custom</python_path>
  <render_submit_class>sites.racoon.modules.command.CustomRenderSubmit</render_submit_class>
  <process_count>3</process_count>
  <thread_count>50</thread_count>
  <process_time_alive>30</process_time_alive>
  <system_class></system_class>
</services>
```

<b>mailserver</b>	The URL of the SMTP mail server
<b>mail_password</b>	The password for accessing the SMTP mail server that requires authentication
<b>mail_user</b>	The user name for accessing the SMTP mail server that requires authentication
<b>mail_port</b>	The port for the SMTP mail server (if different that 25)

<b>mail_sender_disabled</b>	disable using the sender name in sending of email in case the email server does not allow sender's email not owned by the sender
<b>mail_tls_enabled</b>	enable TLS (Transport Layer Security) for the connection to email server
<b>python</b>	The root path of the Python installation. "python" is usually sufficient.
<b>python_path</b>	The server-side location for client files. This location can also be mounted from a shared volume if you wish to maintain stricter server access for clients. For multiple paths, separate with  . e.g. /home/apache/custom/home/apache/custom_two
<b>render_submit_class</b>	The class used for render submissions.
<b>process_count</b>	The number of processes the TACTIC service would spawn. It needs to match the number of ports used in the load balancing scheme in the Apache configuration.
<b>thread_count</b>	The number of worker threads generated for each instance of the TACTIC process. If not set, it defaults to 10 which is too low to handle rapid requests.. TACTIC's default is 50 on new installation. A good balance of process_count and thread_count can improve response time of the server.
<b>process_time_alive</b>	The number of minutes a TACTIC process gets respawned. It helps with the memory consumption inherent with a long-running Python process.
<b>system_class</b>	Allows for an override some of the low level system functionality. For example 'mkdirs' and 'exists'

## Security

This section defines information regarding the services external to TACTIC.

```
<security>
  <ticket_expiry>10 hour</ticket_expiry>
  <authenticate_mode>default</authenticate_mode>
  <authenticate_class></authenticate_class>
  <authenticate_version>2</authenticate_version>
  <case_insensitive_login>>false</case_insensitive_login>>
  <auto_create_user>false</auto_create_user>
  <api_require_password>true</api_require_password>
  <api_password></api_password>
</security>
```

<b>ticket_expiry</b>	The number of hours a login ticket expires after
<b>authenticate_mode</b>	<p>default: This basically just looks at the tactic database for information.</p> <p>autocreate: This autocreates the first time and then leaves the information alone.</p> <p>cache: This caches the information to the tactic database on every login</p>
<b>authenticate_class</b>	<p>A full class path to override the default class "pyasm.security.TacticAuthenticate".</p> <p>Note: Your custom class needs to override the method verify() which takes two arguments: login and password.</p>
<b>authenticate_version</b>	1 is the old way of authentication. 2 is the new way.
<b>case_insensitive_login</b>	If set to 'true', it allows case insensitive login name. When autocreate mode is used, all login entries created will have a lowercase login name. It can be used in combination with Active Directory setup.

<b>auto_create_user</b>	Auto create user in TACTIC during authentication phase if it does not exist. (Deprecated: use "authenticate_mode" in new way of authentication)
<b>api_require_passowrd</b>	Client API script requires password to login or not
<b>api_password</b>	A generic Client API password can be set here

## Database

```
<database>
  <vendor>PostgreSQL</vendor>
  <server>localhost</server>
  <port></port>
  <user>postgres</user>
  <password>none</password>
  <subject_database>sthpw</subject_database>
  <pool_max_connections>1</pool_max_connections>
</database>
```

<b>vendor</b>	The database vendor (software) the database will be installed on.
<b>server</b>	The hostname of the server. This is localhost if TACTIC and the database are on the same server
<b>port</b>	The database connection port
<b>user</b>	The user name for the database connection
<b>password</b>	The password for the database connection.
<b>subject_database</b>	The database where SObject definitions will be stores
<b>pool_max_connections</b>	The pool of connections available for connecting to the database.

## Perforce

```
<perforce>
  <web_dir>perforce</web_dir>
  <p4>p4</p4>
  <port>1666</port>
</perforce>
```

<b>web_dir</b>	The webdir for the perforce connection.
<b>p4</b>	
<b>port</b>	The port to be used for connection to perforce.

## Look

This setting provides a method of setting the TACTIC skin in the server for all users. In this example, the 'BON\_NOCHE' palette specified:

```
<look>
  <palette>BON_NOCHE</palette>
</look>
```

Other available palettes are 'AQUA', 'BRIGHT', 'DEFAULT', 'SILVER', 'AVIATOR', and 'ORIGAMI'. Alternatively, the whole palette can be customized as follows:

```
<look>
  <palette>{
    'color':      '#000000',      # main font color
    'color2':     '#FFFFFF',      # secondary font color
    'color3':     '#FFFFFF',      # tertiary font color
```

```

        'background':    '#FDEEA7',      # main background color
        'background2':   '#1A9481',      # secondary background color
        'background3':   '#003D5c',      # tertiary background color
        'border':         '#666666'      # main border color
    }</palette>
</palette>
</look>

```

The side bar color may not change right away until the next TACTIC service restart.

<b>palette</b>	The default palette setting for all TACTIC users.
----------------	---------------------------------------------------

## Checkin

TACTIC uses the following directory and path settings for internal and client interaction. They are included in the `<checkin/>` tag (for checkins).

<b>versionless_mode</b>	<b>copy</b> or <b>symlink</b> : Turn on versionless mode for checkins for all projects. To set the versionless mode per project, go to <b>Project Admin -&gt; Project Settings</b> and add a the key <b>versionless_mode</b> and the value: <b>copy</b> or <b>symlink</b> .
<b>asset_base_dir</b>	The directory where the assets are stored in the TACTIC server.
<b>web_base_dir</b>	The root URL that maps the asset_base_dir directory
<b>win32_local_base_dir</b>	The base directory in Windows client machines
<b>linux_local_base_dir</b>	The base directory in Linux client machines
<b>win32_sandbox_dir</b>	The default sandbox directory in the Windows client machines (it can be overridden by Remote Repo)
<b>linux_sandbox_dir</b>	The default sandbox directory in the Linux client machines (it can be overridden by Remote Repo)
<b>win32_client_repo_dir</b>	Maps the asset_base_dir directory as seen by the Windows client. For example, if asset_base_dir is on a Linux server with a path like "/home/apache/assets" but from the Windows client, it is mapped as "Z:/assets", then "Z:/assets" should be the value for this setting.  By default, this path is empty because the system assumes the client and server are on the same Windows machine.
<b>linux_client_repo_dir</b>	Same as win32_client_repo_dir except it is from the perspective of a Linux client machine
<b>win32_client_handoff_dir</b>	Windows client-side handoff directory for Client API transactions. (Find out more about the handoff directory below.)
<b>win32_server_handoff_dir</b>	Windows server-side handoff directory for Client API transactions
<b>linux_client_handoff_dir</b>	Linux client-side handoff directory for Client API transactions
<b>linux_server_handoff_dir</b>	Linux server-side handoff directory for Client API transactions
<b>sudo_no_password</b>	It controls whether sudo can be run to change the user id and group id of the files checked in. It is particularly important if you want to ensure files checked in to the TACTIC repository are owned by TACTIC and not overwritable by just any users. If set to true, "no password" should be enabled for the user TACTIC is run as in the OS. e.g. For Fedora, assuming you have sudo installed:  In the file /etc/sudoers, the following line should be uncommented:

```
%wheel ALL=(ALL) NOPASSWD: ALL
```

In the file `/etc/group`, `apache` should be added to the group

```
wheel wheel:x:10:root,apache
```

---

### The handoff directories

Handoff directories can be seen by both the server and the client machines. They are used for 3D checkins and client API interactions, and are important for specifying how the client and server sides see the same location.

For example, if you have the location `//192.168.0.105/handoff` available on your network and it is mounted as `/home/apache/handoff` on a server, then it would be important to include the following entries:

```
<win32_client_handoff_dir>//192.168.0.105/handoff</win32_client_handoff_dir>
<win32_server_handoff_dir></win32_server_handoff_dir>
<linux_client_handoff_dir></linux_client_handoff_dir>
<linux_server_handoff_dir>/home/apache/handoff</linux_server_handoff_dir>
```

### Directory configuration examples

#### Example 1

The assets directory is located on the TACTIC server and allows for read-only access from client machines in the local subnet.

- The assets directory is located on the TACTIC server and allows for read-only access from client machines in the local subnet.
- The handoff directory is located on the TACTIC server and allows for read/write access from client machines in the local subnet
- The Windows and Linux `client_repo_dir` looks directly to the server for the available "assets" share
- The Windows and Linux `client_handoff_dir` looks directly to the server for the available "handoff" share

```
<checkin>
  <asset_base_dir>/home/apache/assets</asset_base_dir>
  <web_base_dir>/assets
  <win32_local_base_dir>C:/sthpw</win32_local_base_dir>
  <linux_local_base_dir>/tmp/sthpw</linux_local_base_dir>
  <win32_sandbox_dir>C:/sthpw/sandbox</win32_sandbox_dir>
  <linux_sandbox_dir>/tmp/sthpw/sandbox</linux_sandbox_dir>
  <win32_client_repo_dir>//192.168.0.105/apache/assets</win32_client_repo_dir>
  <linux_client_repo_dir>//192.168.0.105/apache/assets</linux_client_repo_dir>
  <win32_client_handoff_dir>//192.168.0.105/apache/handoff</win32_client_handoff_dir>
  <win32_server_handoff_dir></win32_server_handoff_dir>
  <linux_client_handoff_dir>/home/apache/handoff</linux_client_handoff_dir>
  <linux_server_handoff_dir>/home/apache/handoff</linux_server_handoff_dir>
</checkin>
```

#### Example 2

- The assets directory is located on another server and mounted locally on the TACTIC server to `/mnt1/assets`.
- The Windows and Linux `client_repo_dir` is mapped/mounted to the TACTIC 'asset\_base\_dir'
- The Windows and Linux `client_handoff_dir` is mapped/mounted to the TACTIC 'server\_handoff\_dir'

```
<checkin>
  <asset_base_dir>/mnt1/assets</asset_base_dir>
```

```
<web_base_dir>/assets  
<win32_local_base_dir>C:/sthpw</win32_local_base_dir>  
<linux_local_base_dir>/tmp/sthpw</linux_local_base_dir>  
<win32_sandbox_dir>C:/sthpw/sandbox</win32_sandbox_dir>  
<linux_sandbox_dir>/tmp/sthpw/sandbox</linux_sandbox_dir>  
<win32_client_repo_dir>z:/assets</win32_client_repo_dir>  
<linux_client_repo_dir>/assets</linux_client_repo_dir>  
<win32_client_handoff_dir>z:/tactic_handoff</win32_client_handoff_dir>  
<win32_server_handoff_dir></win32_server_handoff_dir>  
<linux_client_handoff_dir>/tactic_handoff</linux_client_handoff_dir>  
<linux_server_handoff_dir>/home/apache/tactic_handoff</linux_server_handoff_dir>  
</checkin>
```

## Configure the TACTIC Service

For development, test, or evaluation purposes, there is no need to run TACTIC as a service. The `startup_dev.py` script should suit these purposes adequately. However, for production, it is highly recommended to run TACTIC as a service.

In the `<TACTIC_INSTALL_DIR>/src/install` directory, there is a directory called `service`, with two files:

### **tactic**

This file is used for Unix systems and should be copied to the directory where your particular system looks for service executables.

On Fedora Core, for example, this directory is `/etc/rc.d/init.d/` (Other flavors of Linux can vary slightly.)

When you copy this file, make sure it is an executable:

```
chmod 755 /etc/rc.d/init.d/tactic
```

And to make it start on reboot, set up `chkconfig`:

```
chkconfig --levels 2345 tactic on
```

To start it manually, simply type:

```
/etc/rc.d/init.d/tactic start
```

### **win32\_service.py**

This script is for running TACTIC as a service on Windows machines.

Simply type:

```
python win32service.py install
```

The TACTIC service should be added to your Windows services repository.

To set up to start automatically on boot, go to:

- Control Panel > Administrative Tools > Services
- Click with the right mouse button on "Tactic Application Service" and select Properties.
- Set the "Startup type" to "Automatic".



# TACTIC Configuring SSL

This document discusses security layers that can be implemented on top of the TACTIC service.

## Services covered

- Apache HTTP server
- IIS HTTP server
- PPTP server
- IPsec

## Disclaimer

Southpaw Technology does not provide any support, either direct or implied, for remote access.

Any application that is put on a public network can potentially be compromised, even with rigorous security testing. TACTIC, in its current version, has not been production tested for security scenarios outside of completely trusted networks like intranets. This document does not make any claims that TACTIC has any level of security beyond what its current architecture design allows.

## Functionality and effectiveness of remote access

TACTIC is a bandwidth-intensive application, and client-server performance will be affected by any number of network issues between the client and the server.

There are numerous elements of functionality that go beyond utilizing HTTP port access in enterprise applications of TACTIC. Many 3rd party applications that communicate with TACTIC will produce unexpected behavior when utilized in a fashion that was not intended for the product, such as use in remote applications.

## TACTIC on public networks

HTTP transport co-services can be configured to provide authentication services to TACTIC.

## HTTP zone access

The simplest form of HTTP security authentication zone access. To enable different security scenarios, the HTTP service must be configured for use of these scenarios. Configuration files (usually called .htaccess files) contain a number of settings that can be used for integrating the application with the capabilities of the Web server.

When enabling password zone access, the password is transmitted to the server in cleartext, unless TLS is enabled.

## Apache

Apache uses either directives for directory access in the httpd.conf file, or can be enabled on a per-directory basis, with the use of a .htaccess file. Either way can be used. Apache provides modules for LDAP, MySQL, flat-file, ADS, and many other authentication mechanisms.

## IIS

IIS can be configured at the top level through the IIS snap-in, or by individual configuration file. IIS 7 uses a file called Web.config to hold settings for integration with applications. The Web.config file contains information that control module loading, security configuration, session state configuration, and application language and compilation settings.

## SSL(TLS) support

### Overview

TACTIC can be configured to use the SSL transport layer. This layer is independent of the TACTIC service, and can be tailored to the needs of the deployment without major changes to the TACTIC service.

Both major HTTP servers can be configured for SSL support. There are many materials online available for configuration of the various flavors of these two major HTTP service projects.

Since there are many different versions of these servers, a simple search of “Windows 2003 IIS SSL#?” as an example will yield many HOWTOs and configuration references. Please consult the documentation for these services.

The configuration examples that have been set out below are by no means complete. Depending on the HTTP service used, and the platform used, these examples may not be enough set directives or steps to properly complete the SSL process. They are given as guides.

### Steps

The major steps to utilizing SSL in with TACTIC are

- Enabling TACTIC to converse with SSL
- Enabling the SSL service
- Creating a Virtual Server, or extending the existing server to accept SSL
- Providing CA certificates

## Configuration

### TACTIC configuration

The SSL HTTP layer is kept separate from TACTIC via a proxy, so the only configuration change required of TACTIC is in the tactic\_(OS).conf file. The <security><protocol> directive must tell TACTIC to expect an SSL delivery.

```
<security>
  <protocol>https</protocol>
</security>
```

The setting can be set to either “http#?” or “https#?”.

### Apache

The apache project uses mod\_ssl as a modular way of inserting SSL capabilities into the HTTP service.

The example OS is Fedora 11. “Yum#?” is used to add SSL to apache.

```
[root@lindsay conf.d]# yum install mod_ssl
Loaded plugins: refresh-packagekit
...
Complete!
[root@lindsay conf.d]#
```

Once mod\_ssl is added, the Apache configuration should contain at least these directives. The example directives are contained in conf.d/ssl.conf in the Fedora 11 example. File locations will vary according to OS.

```
LoadModule ssl_module modules/mod_ssl.so
Listen 443

SSLPassPhraseDialog builtin
SSLSessionCache shmcb:/var/cache/mod_ssl/scache(512000)
SSLSessionCacheTimeout 300
SSLMutex default
SSLRandomSeed startup file:/dev/urandom 256
SSLRandomSeed connect builtin
SSLCryptoDevice builtin
<VirtualHost _default_:443>
SSLEngine on
SSLProtocol all -SSLv2
SSLCipherSuite ALL:!ADH:!EXPORT:!SSLv2:RC4+RSA:+HIGH:+MEDIUM:+LOW
SSLCertificateFile /etc/pki/tls/certs/localhost.crt
SSLCertificateFile /etc/pki/tls/certs/localhost.crt
SSLCertificateKeyFile /etc/pki/tls/private/localhost.key
```

As soon as its added and the server is restarted, the SSL service becomes available on the network interface that apache is running on.

## IIS

IIS can be configured at the top level through the IIS snap-in, or by individual configuration file.

To configure SSL on a Web server or a Web site

1. In IIS Manager, double-click the local computer, and then double-click the Web Sites folder. 2. Right-click the Web site or file that you want to protect with SSL, and then click Properties. 3. Under Web site identification click Advanced. 4. In the Advanced Web site identification box, under Multiple identities for this Web site, verify that the Web site IP address is assigned to port 443, the default port for secure communications, and then click OK. Optionally, to configure more SSL ports for this Web site, click Add under Multiple identities of this Web site, and then click OK. 5. On the Directory Security or File Security tab, under Secure communications, click Edit. 6. In the Secure Communications box, select the Require secure channel (SSL) check box. 7. To enable SSL client certificate authentication and mapping features, select the Enable client certificate mapping check box, click Edit, add the 1-to-1 or many-to-1 mappings you need, and then click OK three times.

## Secure transaction processing

Processing transactions securely on the web means that there is a need to be able to transmit information between the web site and the customer in a manner that makes it difficult for other people to intercept and read. SSL, or Secure Sockets Layer, takes care of this. It works through a combination of programs and encryption/decryption routines that exist on the web services host, and in browser programs (like Firefox and Internet Explorer)

## Performance

TLS has encryption/decryption routines as part of its security. These routines can be bandwidth/CPU intensive. Any usage of TLS can compromise TACTIC, if the routines are incorporated into the same host as the TACTIC service. See guides on load-balancing for details on offsetting this.

## VPN support

### Overview

A VPN will provide the most trouble-free access to TACTIC remotely. In this scenario, the authentication/encryption routines are completely removed from the realm of TACTIC configuration. This not only helps to isolate TACTIC from complex configuration issues, but also allows for isolated troubleshooting of remote access issues.

## PPTP

PPTP is Microsoft supplied product. If an enterprise deployment of TACTIC includes ADS authentication, then PPTP can be used as the VPN transport layer. Usually, deployment is quite easily done. In PPTP, usernames and passwords are used to complete the VPN link. PPTP can be considered the “road-warrior” VPN, meaning that it is easily deployed to users.

## IPsec

Ipsec is a suite of protocols used to secure data between hosts. A VPN can be transported on top of this protocol. Typically, two remote hosts are configured to communicate with each other, such as routers. This type of VPN is typically used to connect two offices together.

## Hardware VPNs

Hardware VPNs such as offerings provided by companies like Cisco, can be easily implemented. These Systems are designed for minimal ramp-up, and can be implemented quickly.

## Security Terms

### Man-in-the-middle Attack (Wikipedia)

“is a form of active eavesdropping in which the attacker makes independent connections with the victims and relays messages between them, making them believe that they are talking directly to each other over a private connection, when in fact the entire conversation is controlled by the attacker. The attacker must be able to intercept all messages going between the two victims and inject new ones, which is straightforward in many circumstances (for example, an attacker within reception range of an unencrypted Wi-Fi wireless access point, can insert himself as a man-in-the-middle).”

### SSL (Wikipedia)

“Transport Layer Security (TLS) and its predecessor, Secure Sockets Layer (SSL), are cryptographic protocols that provide security for communications over networks such as the Internet. TLS and SSL encrypt the segments of network connections at the Transport Layer end-to-end.”

### Cleartext (Wikipedia)

Cleartext is transmitted, unencrypted text.

“In a cryptosystem, weaknesses can be introduced through insecure handling of plaintext, allowing an attacker to bypass the cryptography altogether. Plaintext is vulnerable in use and in storage, whether in electronic or paper format.”

### PPTP (wikipedia)

The Point-to-Point Tunneling Protocol (PPTP) is a method for implementing virtual private networks. PPTP uses a control channel over TCP and a GRE tunnel operating to encapsulate PPP packets.

The PPTP specification does not describe encryption or authentication features and relies on the PPP protocol being tunneled to implement security functionality. However the most common PPTP implementation, shipping with the Microsoft Windows product families, implements various levels of authentication and encryption natively as standard features of the Windows PPTP stack. The intended use of this protocol is to provide similar levels of security and remote access as typical VPN products.

## **IPSEC (Wikipedia)**

Internet Protocol Security (IPsec) is a protocol suite for securing Internet Protocol (IP) communications by authenticating and encrypting each IP packet of a data stream. IPsec also includes protocols for establishing mutual authentication between agents at the beginning of the session and negotiation of cryptographic keys to be used during the session. IPsec can be used to protect data flows between a pair of hosts (e.g. computer users or servers), between a pair of security gateways (e.g. routers or firewalls), or between a security gateway and a host.[1]

# Active Directory Integration

## Description

TACTIC provides the ability to easily connect to any active directory installation for both authentication and for synchronization of user data. With a set of directives in the TACTIC configuration file, it is possible to connect to Active Directory for authentication and user information.

This synchronization takes place at login time. At this point, TACTIC takes the desired information for a particular user and caches it into the "sthpw/login" search type. Subsequent requests would normally use an issued ticket given at login time. On these requests, no further querying of active directory is needed until the ticket expires or the user signs out the application.

## Prerequisites

The active directory modules make use of win32 libraries for python. These must be installed in order for the connection to active directory to function properly

## Configuration

There are a number of directives in the TACTIC config file that can be used to configure the active directory settings. These allow you to adjust TACTIC behavior to suit the needs of the facility.

In order to turn on active directory authentication, you must change the authenticate class to the following:

```
authenticate_class: tactic.active_directory.ADAuthenticate
```

The following directives can be set under the active directory category:

**domains:** This is a "|" delimited list of the domains that exist in the network. If specified, a selection box for domains will be added to the login page.

**allow:** can be "all", which allows everyone to log in if authentication is approved or it can point to the name of a specific Active Directory attribute that must be set to True. If a person is denied access, they will receive the error: "Permission denied due to insufficient Active Directory clearance".

**default\_groups:** defines the default groups that a user will belong to if none is specified. Multiple groups are delimited by "|".

**default\_license\_type:** determines the default license type for a user if none is specified in the Active Directory attribute "tacticLicenceType".

## Example of Typical Entry

Below is an example of a typical entry in the TACTIC config file:

```
<active_directory>
<domains>xxx|yyy|zzz</domains>
<allow>tacticEnabled</allow>
<default_groups>client</default_groups>
<default_license_type>user</default_license_type>
```

</active\_directory>

## Example Configurations

Allow anyone to login:

```
<active_directory>
```

```
<allow>all</allow>
```

```
</active_directory>
```

Allow anyone to login and will be put in the "client" group if user has no groups specified.

```
<active_directory>
```

```
<allow>all</allow>
```

```
</active_directory>
```

Only allow those with the attribute tacticEnabled in Active Directory set to "true"

```
<active_directory>
```

```
<allow>tacticEnabled</allow>
```

```
</active_directory>
```

Enable users to select a domain (xxx, yyy or zzz) in the login screen

```
<active_directory>
```

```
<allow>all</allow>
```

```
<domains>xxx|yyy|zzz</domains>
```

```
</active_directory>
```

## Mapping

Active Directory attributes use camel case notation (aaaBbbCcc), while TACTIC users lowercase with underscore separators for columns (aaa\_bbb\_ccc). In order to maintain consistency within the TACTIC application, a mapping of columns from active directory to TACTIC is provided. The following mappings are made by default:

mail	email
telephoneNumber	phone_number
department	department
displayName	first_name, last_name (broken up)
tacticLicenceType	license_type

The Active Directory variable "tacticLicenseType" is a custom variable that indicates which type of license a particular user can occupy in TACTIC. If this attribute is missing from a user's active directory profile, then they will be denied a login. This attribute can be used to determine if a particular user in active directory is allowed to login to TACTIC.

The only supported license for this attribute are "user" and "default". Other license types have not yet been implemented yet.

## Groups

On log in, TACTIC will look at all of the groups that a user belongs to in Active Directory and match those group names to the "ad\_login\_group" column in the "sthpw/login\_group" search type. This grouping list will be synchronized at this time, removing the users from groups not specified in Active Directory and adding those that are specified. This means that Active Directory is in full control of the groups that a user is part of and therefore must be managed entirely in Active Directory.

For the name of the group, TACTIC only looks at the root of the path to map the group name. For example, an active directory group with the following distinguished name:

memberOf: CN=supervisor,OU=Users,OU=EIS,DC=domain,DC=us,DC=xxxx,DC=com

TACTIC will need only "supervisor" to be entered in the "ad\_login\_group" column.

## Exceeding License

If on logging in, the number of users exceeds the number of users in the license, then that user will be denied access and an entry in the "sthpw/login" search type will not be made. However, all other users currently registered can continue to work normally.



# Fileserver

## Relocating the 'assets' directory

### Overview

proper management of assets and asset metadata are essential to managing the TACTIC service. Versioned assets are by far the most disk space consuming element of asset management. TACTIC can store its asset data in any filesystem path location. All that is required is that the tactic configuration file contains the path to a directory writable by the TACTIC service user.

### Types of Access

- **Local Access** in a simple configuration, the TACTIC service is enabled on the TACTIC host, and all assets checked in and checked out of TACTIC are stored on the local filesystem. Typically a user is created to run the TACTIC service, or an already assigned user is simply used to run the TACTIC service.
- **Network Access** in an addition to the simple configuration, the TACTIC service is enabled on the tactic host and all assets checked in and checked out tactic are stored on a network mount. Typically a user is created to run the TACTIC service and be able to write to the network mount.

### Permissions

- **TACTIC user permissions** It is important to note that in a network accessible filesystem, allocation of permissions are important only for the TACTIC user. Regular system users should not have access to the TACTIC assets directory.
- **Browsable access to assets** During some conversions to the management of assets by TACTIC, a frequent request is for regular user access to the assets directory managed by TACTIC. There really is not the much to see in these directories as tactics naming convention for versioning of assets creates files and directories that are largely mysterious in their arrangement.

Is very important that the files that are managed by tactic are not touched by regular users. Manipulating files or directories managed by tactic will definitely result in data loss. Regular users should not have writable access to tactic asset directories.

### Moving the current 'assets' directory

Before you begin this process, you should first move or copy your assets to their new location using a network share ideally named 'assets'. For a new installation, you should create an 'assets' share or directory in your new location.

### Rename the current 'assets' directory

In most cases, it is ideal to relocate the `assets` directory to a dedicated file server. If you already have an assets directory, you can rename it to "assets\_temp" to break the current connection. You will know the connection is broken when your asset and project thumbnails are no longer visible in the user interface. Once the assets are successfully moved to the new location you will know they are accessible when the assets and thumbnails are visible again.

In Linux, the steps to rename the current assets will be similar to the example below:

- 1) Navigate to the apache directory `cd /home/apache`
- 2) In the shell run `mv assets assets_bak`

3) If you run **ls -la**, you should get a listing confirming the change

```
-bash-3.2$ cd /home/apache/
-bash-3.2$ mv assets assets_bak
-bash-3.2$ ls -la
total 36
drwxr-xr-x 5 apache apache 4096 2008-05-29 04:41 .
drwxr-xr-x 3 root root 4096 2008-02-09 07:04 ..
drwxr-xr-x 2 apache apache 4096 2008-03-01 02:25 assets_bak
-rw----- 1 apache apache 157 2008-02-09 14:22 .bash_history
drwxr-xr-x 5 apache apache 4096 2008-03-01 02:25 projects
lrwxrwxrwx 1 apache apache 12 2008-03-01 02:25 tactic -> tactic-1.5.3
drwxr-xr-x 5 apache apache 4096 2008-02-29 17:32 tactic-1.5.3
-bash-3.2$ _
```

4) To confirm the operation was successful, log in to TACTIC and you should find that none of the thumbnails or assets are available.

## Edit the TACTIC configuration file

The config file is named differently on each operating system:

Filename	Operating System	Location
tactic_win32-conf.xml	Windows	TACTIC_INSTALL_DIR/projects/config
tactic_linux-conf.xml	Linux	TACTIC_INSTALL_DIR/projects/config

### Updating the tactic\_linux-conf.xml file (Linux)

In the `<checkin/>` tag in the `tactic_linux-conf.xml` config file, the `asset_base_dir` location defines where assets are stored by TACTIC. This location could be on the TACTIC server (the default is `/home/apache/assets`), or preferably on a network shared drive.

This path is defined from the perspective of the TACTIC server. An example of this entry where it looks to a share on another server would be:

```
asset_base_dir="/home/apache/assets"
```

This location on the server would be mounted to the central assets server which in this case would be:

```
//192.168.0.105/assets
```

This share would have to allow the 'apache' user (which is TACTIC) to read and write to it.

There are also two variables that need to be set in the following Apache config file:

```
/etc/httpd/conf.d/tactic.conf
```

### Change this:

```
<Directory "/home/apache/assets" >
  Options FollowSymLinks
  AllowOverride None
  Order Allow,Deny
```

```
    Allow from All
</Directory>
```

**To:**

```
<Directory "/mnt/d1/tactic/assets" >
    Options FollowSymLinks
    AllowOverride None
    Order Allow,Deny
    Allow from All
    EnableSendfile Off
    EnableMMAP Off
</Directory>
```

You will also need to change the assets alias further down in the config file:

**Change this:**

```
Alias /assets "/home/apache/assets"
```

**To:**

```
Alias /assets "/mnt/d1/tactic/assets"
```

For the `win32_client_repo_dir` location, it should include the `asset_base_dir` path as seen by the client machine. For example, suppose the `asset_base_dir` path is `/home/apache/assets` on a Linux box. However, from a Windows client, it is mapped as:

`"Z:/assets"` or `"//192.168.0.105/assets"`

The `win32_client_repo_dir` location would then be:

`win32_client_repo_dir="//192.168.0.105/assets"`

The `linux_client_repo_dir` location is analogous to `win32_client_repo_dir`, except it is meant for a Linux client.

**Updating the `tactic_win32-conf.xml` file (Windows)**

In the `<checkin/>` tag in the `tactic_linux-conf.xml` config file, the `asset_base_dir` location defines where assets are stored by TACTIC. This location could be on the TACTIC server (the default is `/home/apache/assets`), or preferably on a network shared drive.

This path is defined from the perspective of the TACTIC server. An example of this entry where it looks to a share on another server would be:

```
asset_base_dir="/home/apache/assets"
```

This location on the server would be mounted to the central assets server which in this case would be:

```
//192.168.0.105/assets
```

This share would have to allow the 'apache' user (which is TACTIC) to read and write to it.

There are also two variables that need to be set in the following Apache config file:

`/etc/httpd/conf.d/tactic.conf`

**Change this:**

```
<Directory "/home/apache/assets" >
    Options FollowSymLinks
    AllowOverride None
```

```

    Order Allow,Deny
    Allow from All
</Directory>

```

**To:**

```

<Directory "/mnt/dl/tactic/assets" >
    Options FollowSymLinks
    AllowOverride None
    Order Allow,Deny
    Allow from All
    EnableSendfile Off
    EnableMMAP Off
</Directory>

```

You will also need to change the assets alias further down in the config file:

**Change this:**

```
Alias /assets "/home/apache/assets"
```

**To:**

```
Alias /assets "/mnt/dl/tactic/assets"
```

For the `win32_client_repo_dir` location, it should include the `asset_base_dir` path as seen by the client machine. For example, suppose the `asset_base_dir` path is `"/home/apache/assets"` on a Linux box. However, from a Windows client, it is mapped as:

`"Z:/assets"` or `"//192.168.0.105/assets"`

The `win32_client_repo_dir` location would then be:

`win32_client_repo_dir="//192.168.0.105/assets"`

The `linux_client_repo_dir` location is analogous to `win32_client_repo_dir`, except it is meant for a Linux client.

## Configure the Remote Repo

The remote repository (repo) setting describes the specific environment that remote users or a remote facility may use, in the situation where it differs from the environment used by the master repository.

To set up a remote repo, you can insert an entry that represents users or a group of users that fall under a certain IP address or IP mask combo.

**Note**

If you want everyone at an IP address to use the same remote repo, a typical IP mask value is `255.255.255.255`

The login name is only required when you are not using an IP address or IP mask combo to specify users. The sandbox path and local repo path can be a network path like:

```
\\<server_name>\<share_name>\..\repo
```

or (for Windows)

```
Z:/repo
```

# Scalability

## TACTIC Scalable Configuration Examples

TACTIC and its co-services can be distributed over multiple machines. This can be specific combinations of TACTIC and co-services.

For purposes of instruction and brevity, the configuration examples are not targeted towards particular multiple machine solutions; rather, the configuration examples can be altered to suit the individual environment.

Here are some examples:

- HTTP server, DB, and TACTIC server
- HTTP server, HTTP server, DB server, and TACTIC server
- HTTP server, TACTIC server 1, TACTIC server 2, and DB server,

and so on.

### Example Configuration: One Server

Single machine for small scale environment, limited usage

- all services on one machine

### Example Configuration: Two Servers

Two machines to spread workload.

- HTTP and TACTIC server
- DB server

### Example Configuration: Three Servers

For larger environments where automated usage and heavy reporting usage by users through the GUI.

- HTTP & DB server
- TACTIC server 1
- TACTIC server 2

## Load-Balancing TACTIC

TACTIC runs on a multi-threaded application server ("Cherrypy"), but this application server uses Python threads and not system threads. This means that all of the threads in a single python process run on the same processor.

To overcome this limitation, you should run a number of full TACTIC processes across a number of different ports and allow the webserver to load-balance requests across these ports. By default in the the tactic installation config file, `/home/apache/projects/config/tactic_linux-conf.xml`, the process count is set to 3. Add this entry if it does not exist.

```
<services>
```

```
...
...
<process_count>3</process_count>
</services>
```

There are many ways to load-balance TACTIC. Two different ways will be described in the following:



## Note

Warning: For load balancing, only use either:

1) the Proxy Balancer method (recommended)

**or**

2) the RewriteRule method (not recommended).

Do **not** use both methods at the same time.

1. The first way (recommended way) is to make use of Apache's `proxy_balancer_module`. Ensure it is already enabled in the main Apache config file in `/etc/httpd/conf/httpd.conf`. In the `tactic.conf` file (provided with the TACTIC installation usually placed near the Apache 2 installation config area like `/etc/httpd/conf.d/..` or `/etc/apache2/..`), make sure these lines below are present. This set-up corresponds to a `process_count` of 3 in the `tactic.conf` file. If there are more, you just have to add more **BalancerMember** line accordingly.

```
ProxyPreserveHost on

# Using the ProxyPass directives
<Proxy balancer://tactic>
  BalancerMember http://localhost:8081/tactic
  BalancerMember http://localhost:8082/tactic
  BalancerMember http://localhost:8083/tactic
</Proxy>
ProxyPass /tactic balancer://tactic
ProxyPass /projects balancer://tactic
```

This method is more desirable as it doesn't need the `load_balance.txt` required for the second method. In addition, it is mandatory if the `process_time_alive` directive is used under services in the TACTIC config file in `/home/apache/projects/config/tactic_linux-conf.xml`.

2. The second way (old way) is to make use of Apache's `rewrite_module`. In the `tactic.conf` file (provided with the TACTIC installation usually placed near the Apache 2 installation config area like `/etc/httpd/conf.d/..` or `/etc/apache2/..`), comment out the lines under "for cherrypy":

```
# for cherrypy
#RewriteRule ^/tactic/(.+) $ http://localhost:8081/tactic/$1 [P,L]
#RewriteRule ^/tactic http://localhost:8081/tactic/ [P,L]
#RewriteRule ^/projects/(.+) $ http://localhost:8081/tactic/$1 [P,L]
#RewriteRule ^/projects http://localhost:8081/tactic/ [P,L]
```

Then in the same file uncomment the lines for the random load balancing scheme:

```
# This is for using a random load_balancing scheme
RewriteMap lb rnd:/home/apache/sites/load_balance.txt
RewriteRule ^/tactic/(.+) $ http://${lb:dynamic}/tactic/$1 [P,L]
RewriteRule ^/projects/(.+) $ http://${lb:dynamic}/tactic/$1 [P,L]
RewriteRule ^/tactic http://${lb:dynamic}/tactic/ [P,L]
RewriteRule ^/projects http://${lb:dynamic}/tactic/ [P,L]
```

These lines will look at the file `"/home/apache/sites/load_balance.txt"` to find out how to replace the variable `${lb:dynamic}` with a randomly chosen value from a list.

Note: The path for `load_balance.txt` cannot have spaces in it or Apache service will not start.

A sample `load_balance.txt` file looks like the following:

```
##
## load_balance.txt -- rewriting map
##
dynamic localhost:8081|localhost:8082|localhost:8083
```

The `process_count` being set to 3 corresponds to the three processes running at port 8081, 8082, 8083 respectively. You can see the three `startup.py` processes by running:

```
ps -wef | grep python
```

The higher the `process_count` is set, the more memory is needed in the system. If you set it to 10 for heavier usage, the `load_balance.txt` should look like this:

```
## this is in one line in the file
dynamic localhost:8081|localhost:8082|localhost:8083|localhost:8084|localhost:8085|
localhost:8086
      |localhost:8087|localhost:8088|localhost:8089|localhost:8090
```

**Restart the apache service and tactic service after changing their config files.**

To verify if you have set up load-balancing correctly, please follow this tutorial in our support site:

```
http://support.southpawtech.com/tutorial/simple-load-balance-test
```

For more information on load balancing using `mod_rewrite`, refer to the `mod_rewrite` documentation located at:

**[http://httpd.apache.org/docs/2.0/mod/mod\\_rewrite.html](http://httpd.apache.org/docs/2.0/mod/mod_rewrite.html)**

# Troubleshooting

## TACTIC Service Troubleshooting

### TACTIC Service Troubleshooting

1. I get a proxy error in my browser that looks like the following:

```
Proxy Error

The proxy server received an invalid response from an upstream server.
The proxy server could not handle the request /POST /tactic/admin/
<http://192.168.14.113/tactic/admin/>/

Reason: *Error reading from remote server
```

This message tells you the TACTIC service has stopped. If you are running other processes on port 80 (for example, Skype), this can cause a problem with the TACTIC service. Stop the conflicting service. Then restart TACTIC in the TSI by logging in as root and running the command:

```
service tactic start
```

2. What if the TACTIC host memory is full?

If the memory is full, restarting the TACTIC service will remove this memory. If the problem persists or occurs again, contact Southpaw. A memory leak can occasionally occur when a user is repeatedly viewing a very large table with a huge number of entries (>5000). Restarting the service will clear this memory.

3. What if the TACTIC host CPU is at 100%?

Use the Windows Task Manager to kill the process that is taking 100% of the CPU. The TACTIC service will automatically recreate the process. Normally, this will clear the problem.

4. What if the user sees a Proxy Error?

This means that the IIS service cannot contact the TACTIC application server. Look in the Windows services and restart the TACTIC service. If the problem persists, contact Southpaw.

## Diagnostic Tools

To diagnose issues with TACTIC, several tools can be used.

## netstat

This command line tool reveals active ports on the local machine.



```

leowiz:~ root# netstat -a
Active Internet connections (including servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         (state)
tcp4      0      0 192.168.80.128.ssh      192.168.80.1.46575     ESTABLISHED
tcp4      0      0 *.*                      *.*                      CLOSED
tcp46     0      0 *.http                  *.*                      LISTEN
tcp4      0      0 192.168.80.128.ssh      192.168.80.1.50126     ESTABLISHED
tcp46     0      0 *.vnc-server            *.*                      LISTEN
tcp4      0      0 *.ssh                   *.*                      LISTEN
tcp6      0      0 *.ssh                   *.*                      LISTEN
tcp4      0      0 localhost.ipp           *.*                      LISTEN
tcp6      0      0 localhost.ipp           *.*                      LISTEN
udp4      0      0 *.net-assistant         *.*                      LISTEN
udp4      0      0 192.168.80.128.ntp      *.*                      LISTEN
udp6      0      0 localhost.ntp           *.*                      LISTEN
udp4      0      0 localhost.ntp           *.*                      LISTEN
udp6      0      0 localhost.ntp           *.*                      LISTEN
udp4      0      0 *.ntp                   *.*                      LISTEN
udp6      0      0 *.ntp                   *.*                      LISTEN
udp4      0      0 *.ntp                   *.*                      LISTEN
udp6      0      0 *.ntp                   *.*                      LISTEN
udp4      0      0 *.mdns                  *.*                      LISTEN
udp6      0      0 *.mdns                  *.*                      LISTEN
Active LOCAL (UNIX) domain sockets
Address Type Recv-Q Send-Q Inode Conn Refs Nextref Addr
41ad880 stream 0 0 46ad830 0 0 0 /private/tmp/ARD_ABJMMRT
41ce770 stream 0 0 0 3e22e58 0 0 /var/run/mDNSResponder
3e22e58 stream 0 0 0 41ce770 0 0
41ce5d8 stream 0 0 0 41ceb28 0 0 /var/tmp/
SCDynamicStoreNotifyFileDescriptor-20739
41ceb28 stream 0 0 0 41ce5d8 0 0
41cef68 stream 0 0 0 3e22dd0 0 0
3e22dd0 stream 0 0 0 41cef68 0 0
3e22088 stream 0 0 0 41ad330 0 0
41ad330 stream 0 0 0 3e22088 0 0
41ce6e8 stream 0 0 0 41ce908 0 0
leowiz:~ root#

```

## nmap

This command line tool allows port-scanning of an IP address. It can be used to remotely determine if a host is running HTTP.

```

[root@espresso ~]# nmap 192.168.80.128

Starting Nmap 4.76 ( http://nmap.org ) at 2010-03-23 15:58 EDT
Interesting ports on 192.168.80.128:
Not shown: 997 closed ports
PORT      STATE SERVICE
22/tcp    open  ssh
80/tcp    open  http
5900/tcp   open  vnc
MAC Address: 00:0C:29:9D:E8:46 (VMware)

Nmap done: 1 IP address (1 host up) scanned in 6.66 seconds
[root@espresso ~]#

```

In the above example, an http service seems to be running on the machine with the IP of 192.168.80.128

```
[root@tactic-tsi ~]# nmap localhost
Starting Nmap 4.52 ( http://insecure.org ) at 2010-03-23 16:10 EDT
Interesting ports on tactic-tsi.localdomain (127.0.0.1):
Not shown: 1705 closed ports
PORT      STATE SERVICE
22/tcp    open  ssh
80/tcp    open  http
111/tcp   open  rpcbind
139/tcp   open  netbios-ssn
445/tcp   open  microsoft-ds
5432/tcp  open  postgres
8081/tcp  open  blackice-icecap
8082/tcp  open  blackice-alerts
10000/tcp open  snet-sensor-mgmt

Nmap done: 1 IP address (1 host up) scanned in 0.101 seconds
[root@tactic-tsi ~]#
```

In this example, TACTIC and Apache are running on the same local machine, with TACTIC taking up 2 processes, and 2 ports, 8081, and 8082

# Maintenance

## TACTIC Backup and Restore

### Overview

Like any other data producing service, TACTIC requires a backup regimen. The data in that TACTIC produces and manages must be backed up in accordance with the backup policy of the departments that manage the TACTIC service.

**Backup policy definition** TACTIC managers should create a backup policy for TACTIC data. A backup policy is extremely important, as data loss within the TACTIC service is catastrophic.

**What needs be backed up** TACTIC manages data in three parallel scopes;

- **versioned assets** Versioned assets are all the files that are checked in and out of the tactic service.
- **asset metadata** Asset metadata are all the data produced by user interaction with the tactic service. •
- **project metadata** Project metadata are all data produced by the creation of a project within tactic the tactic service.

Tactic data is all of equal importance. The data is all interrelated, and thus all data must be treated with equal importance in the backup regimen.

**frequency of backups** The frequency of backup of tactic data depends on the policies of the TACTIC managers. An examination of the frequency of use of the tactic service, combined with the down time potentially required to back up tactic data should be considered.

**Backup methods** the only consideration that tactic managers should take into account when creating a backup policy for tactic data is that tactic data produced is synchronized. This is accomplished via a transaction system within tactic. This transaction system relies on co-services to store transacted data. During the backup process, tactic and its co-services should be stopped to prevent any loss of synchronization to these co-services.

**Versioned assets** Versioned assets are all the files that are checked in and out of the tactic service. Typically the tactic service works in conjunction with a co-service such as a network file storage service to accomplish its tasks of asset management. Thus the task of backing up tactic of versioned assets onto these systems usually overlaps with the file management policies of the IT department. Most enterprise class network file storage systems, and third party file backup systems can accomplish the task of backing up tactic assets. Redundant raid storage, snapshots, and offsite backups can all be utilized to accomplish version and asset backups.

### Procedure

It is highly recommended that you back up your TACTIC server using a regular schedule. In the event of a hardware failure, you will be able to restore your TACTIC server fully from the latest backup if you have taken the following three backup steps:

- 1) Back up the 'assets' directory
- 2) Dump the TACTIC database
- 3) Back up the TACTIC program directory



## Note

You may want to stop the tactic service while you do your backup process. To do so, run the following commands:

**tactic service stop**

**tactic service start**

## Back up the 'assets' directory

The 'assets' directory is the repository where TACTIC stores all of the asset files. By backing up this directory, you can restore all of your asset files in the event of a database crash into a clean TACTIC-managed directory structure.



## Note

You may need to contact your TACTIC server administrator if your 'assets' directory has been redirected to another location.

### For backup:

#### Windows

The 'assets' directory on a Windows install is located by default in:

**C:\assets**

#### Linux

The 'assets' directory on a Linux install is located by default in:

**/home/apache/assets**

### For restore:

To restore the TACTIC 'assets' directory, you have to restore your backup to the current 'assets' location.

## Dump the TACTIC database

To dump the TACTIC data base you need to log in to the postgresQL database and perform a database dump.



## Note

For both Linux and Windows the database file is in the 'assets' directory, although you may redirect the location to your backup location. Also, the TACTIC default for the database is to have no password. If you have added a password, you may need to enter it into your postgres commands with the **-P** tag.

### For backup:

#### Windows

**pg\_dumpall -U postgres -c > c:\assets\tacticDatabase.sql**

#### Linux

**pg\_dumpall -U postgres -c > /home/apache/assets/tacticDatabase.sql**

### **For restore:**

To restore the TACTIC database run the command:

```
psql -U postgres < tacticDatabase.sql
```

## **Back up the TACTIC program directory**

This last step, although not completely necessary, is recommended because it takes a snapshot of your TACTIC source code and project settings at the time of backup.

### **For backup:**

#### **Windows**

The folders to back up are:

**C:\Program Files\southpaw\tactic**

**C:\Program Files\southpaw\projects**

#### **Linux**

The folders to back up are:

**/home/apache/tactic**

**/home/apache/projects**

### **For restore:**

To restore the TACTIC program files, you have to restore the **tactic** and **projects** directories to their original locations.

# Database Backup Automation

## Automation in UNIX

### Overview

The TACTIC database needs backing up as part of a routine maintenance on the TACTIC system.

### Procedure

1. Log into the TACTIC server as root
2. Make a backup of the existing `/etc/crontab` -the original crontab should look something like this:

```
SHELL=/bin/bash PATH=/sbin:/bin:/usr/sbin:/usr/bin
MAILTO=root
HOME=/

# run-parts
01 * * * * root run-parts /etc/cron.hourly
02 4 * * * root run-parts /etc/cron.daily
22 4 * * 0 root run-parts /etc/cron.weekly
42 4 1 * * root run-parts /etc/cron.monthly
```

3. The following line is an example of code that will write the date out to a file and run on the 15th minute of every hour:

```
15 * * * * root date > /root/out
```

Modify this example code to run in the next few minutes and add it to the crontab. To see if the cron script ran, after the time has passed, verify that the script wrote out the time to the file `/root/out`. The following line is an example of how to backup the TACTIC database every day at 3:45am yum

```
45 3 * * * root /usr/bin/pg_dumpall -U postgres > /tmp/my_tactic_db_my_date
```



### Note

Be careful as this example will overwrite the backup every day . Another more clever way is the name the file with the date:

```
45 3 * * * root /usr/bin/pg_dumpall -U postgres
> /root/my_tactic_db_`date +%Y-%m-%0e_%H:%m:%S`
```

or

```
45 3 * * * root my_date=`date +%Y-%m-%0e_%H:%M:%S`;  
/usr/bin/pg_dumpall -U postgres > /tmp/my_tactic_db_${my_date}
```



## Important

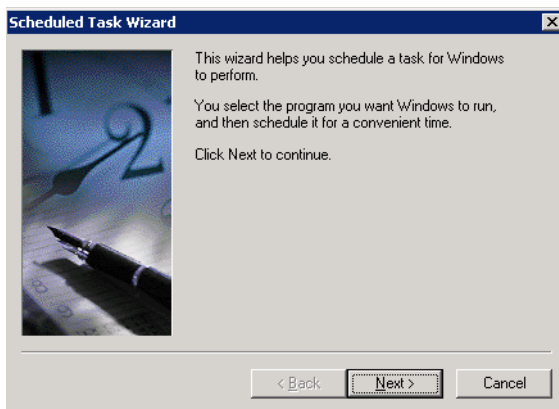
**From crontab manpage:** The ``sixth'' field (the rest of the line) specifies the command to be run. The entire command portion of the line, up to a newline or % character, will be executed by /bin/sh or by the shell specified in the SHELL variable of the cronfile. Percent-signs (%) in the command, unless escaped with backslash (\), will be changed into newline characters, and all data after the first % will be sent to the command as standard input.

## Automation in Windows

By using Task Scheduler can schedule tasks such as to automate DB backup to run at a time that is most convenient. Task Scheduler starts each time Windows is started, and runs as a background process. With Task Scheduler, you can: Schedule a task to run daily, weekly, monthly.

To add a scheduled task:

1. Create a windows batch script to back up the database
2. Click Start->Control Panel->Scheduled Tasks->Add scheduled Task
3. Create the task.



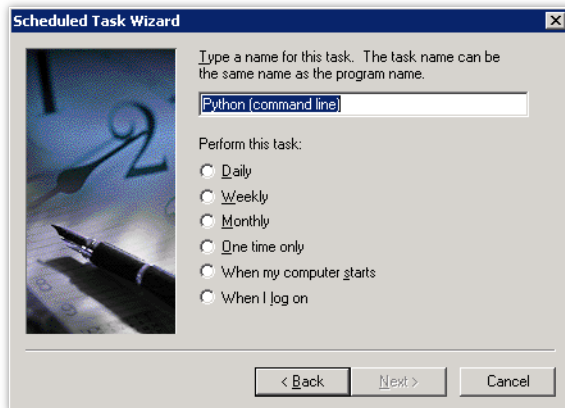
4. Use the provided python script to dump the database.



5. Run the task according to the schedule required.



- 6.



7. At the concluding stage of the scheduled tasks wizard, be sure to check the "Open advanced properties for this task when I click Finish"





Edit the command line to read "<path to python>\python dbbackup.py", and click "OK"

# TACTIC logs

## Overview

In a default installation tactic stores its logs in a single file. For proper maintenance, this file must be rotated by the host operating system. This action must be set in the host operating system. As tactic has no facility to control the log files it makes as of yet, it may be necessary to configure an external tool to rotate logs.

## Prerequisites

The host operating system must have a facility to rotate text logs on a regular chronological basis.

## Configuration

Logrotate is used as a tool to rotate text files on a chronological basis. The tool allows automatic rotation, compression, removal and mailing of log files.

### Directives

This is a partial list of logrotate directives.

- **missingok**: If the log file is missing, go on to the next log file without issuing an error message.
- **copytruncate**: Truncate the original log file to zero size in place after creating a copy, instead of moving the old log file and optionally creating a new one
- **rotate 7** : Log files are rotated 7 times before being removed or mailed to the address specified in a mail directive. If count is 0, old versions are removed rather than rotated.
- **compress**: Old versions of log files are compressed with gzip to save disk space.
- **notifempty**: Do not rotate the log if it is empty
- **sharedscripts postrotate /etc/init.d/lighttpd reload endscript**:

### Default configuration

Logrotate's main configuration file `/etc/logrotate.conf`

Applies the main configuration settings from this file to all log rotation settings, unless overridden by individual directives on a per-log basis.

```
# see "man logrotate" for details
# rotate log files weekly
weekly
# keep 4 weeks worth of backlogs
rotate 4
# create new (empty) log files after rotating old ones
create
# uncomment this if you want your log files compressed
#compress
# RPM packages drop log rotation information into this directory
include /etc/logrotate.d
# no packages own wtmp -- we'll rotate them here
/var/log/wtmp {
monthly
create 0664 root wtmp
rotate 1
```

```
}
```

## Example Service Configuration

This is an example logrotate configuration for HTTP. The configuration file is `/etc/logrotate.d/httpd`

```
/var/log/httpd/*.log {  
    weekly  
    rotate 52  
    compress  
    missingok  
    notifempty  
    sharedscripts  
    postrotate  
        /bin/kill -HUP `cat /var/run/httpd.pid 2>/dev/null` 2> /dev/null || true    endscrip  
}
```

On the example linux system, service or server specific configurations are stored in `/etc/logrotate.d` directory. For example here is sample apache logrotate configuration file:

In this example, HTTP logs are not deleted until they are at least a year old, and are rotated on a weekly basis. There are other configuration options available, but they will not be discussed in this tutorial. Please look online for more information on these other options. Depending on the requirement, each log file may be handled at different intervals.

The lines between `postrotate` and `endscript` (both of which must appear on lines by themselves) are executed after the log file is rotated. These directives may only appear inside a log file definition. In our case we are reloading `lighttpd`.

## Example TACTIC configuration

The configuration goal is get logrotate to get the tactic log files rotated for our needs and requirements.

This is an example logrotate configuration for HTTP. The configuration file is `/etc/logrotate.d/tactic`

Remember to restart the logrotate services after any additions to logrotate configuration.

```
/home/apache/tacticTemp/log/stdout.log {  
    notifempty  
    daily  
    rotate 365  
    missingok  
    copytruncate  
    create 0600 apache apache  
}
```

# TACTIC Server VM

## TACTIC VM Setup and Install

### Evaluating TACTIC on Windows and Linux

The TACTIC VM lets you run a virtual machine on Windows or Linux, and provides an easy way to evaluate the TACTIC platform without changing your operating system. The VM requires VMware Player for Windows or Linux,

**Q.** Will my computer be adversely affected if I run VM ?

**A.** Your computer will not be affected by the VM. Aside from requiring a large amount of memory (the TSI unzips into a folder needing at least 5-10 GB), the TACTIC virtual machine does not interact with your host machine. At the end of the evaluation period, you can either continue using the TSI for production, migrate your data to a new full server install or simply delete the TSI directory. (Note that if you delete the TSI directory, all evaluation data you entered into the TACTIC evaluation is destroyed.)

### What You Need

#### Request and download the TACTIC Server Image (TSI)

The TSI is available on request from Southpaw Technology. When you contact the Southpaw sales or support representatives and set up an evaluation account, they will send you a URL and login/password information so you can begin the trial.

For more information, visit:

**<http://www.southpawtech.com>**

#### Download VMware Player or server

The VMware player is a license-free player you can download from

**<http://vmware.com/download/player/>**

VMware currently supports Microsoft Windows XP, Windows Vista and many flavors of Linux. To streamline the evaluation process, we chose the Fedora Linux-based operating system to create the TSI virtual machine image. (Although you will be running the VM on any of many supported operating systems, you will see the Fedora Linux when you use the VM.)

#### Download VMware Server

The VMware server is a full-featured service for Virtual machines

VMware server is a service that allows users to run VMs silently in the background. No window is needed, and the server can be configured to run the VM on host machine startup. Additionally, there are several interesting options that allow for more flexible operation of a VM.

- **Web UI**
- **Pause** The ability to pause a VM is useful for cycling the VM host.
- **Snapshot a VM** The VMs current state can be saved and recalled in the future. Note that if the VM is reverted to a snapshot, then any changes that have occurred since the snapshot was taken will be permanently deleted.

- **Change hardware** The VM can be modified to change hardware. For example, another network interface, or a USB interface



## Note

The instructions for running a VM can be found in the VMware server documentation. Running the VM from VMware player is covered in this document.

### Web Browser

We recommend you use Mozilla Firefox as your web browser to access the TSI. You can download Firefox at:

**<http://www.mozilla.com/en-US/firefox/>**

### Login Info

There are three sets of login info to remember:

1. VM Linux user

user: root password: south123paw

2. TACTIC UI in browser

user: admin password: tactic

3. Windows Samba share

user: apache password: south123paw

## VM networking

### Networking

When VMware software is installed, several new network interfaces can become available, depending on the options selected during the installation process. Although any one of the interfaces can be used to connect to the VM, it is advised to install all three network interfaces, as this allows the most flexibility



## Note

Successful operation of a virtual machine may require some input from system administrators within a network environment.

- NAT
  - If it becomes necessary to isolate the VM on a host machine, then the NAT interface can be used to connect to the VM.
  - Internet and LAN connectivity can be utilized through the NAT interface if the host machine is connected to an external network such as the internet or a LAN. Allowing the VM to communicate with a LAN may require changes to the routing system on the LAN. If this is a requirement, then bridged networking may be the better option.
  - NAT is a complete network that originates at the host machine, and is a self-contained router with DHCP services. The VM, once run, will usually ask the host machine for an IP address to assign to a network interface. The host machine can then connect to the VM interface through this IP.

- Bridged
  - If there are machines other than the host machine that are required to connect to the VM, then the bridged connection should be used.
  - The only requirement that bridged networking has is that there are appropriate services for the operation of the interface, such as DHCP on the host machines network. If these services do not exist, then the VM network interface needs to have manually set options.
- Host Only
  - To isolate the TSI completely, the “Host Only” option can be used.
  - Host Only is a complete network that originates at the host machine, and is a self-contained router with DHCP services. The VM, once run, will usually ask the host machine for an IP address to assign to a network interface. The host machine can then connect to the VM interface through this IP.
  - The VM is completely isolated from the host machines LAN. There is no network connectivity, therefore no LAN or internet will be available on the VM.

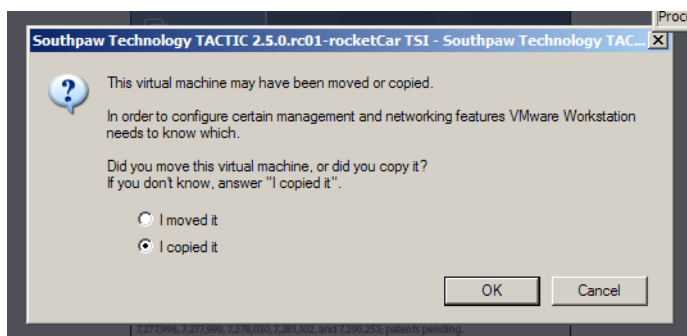
## Starting Up the TSI in VMware Player

After you start up the VMware Player, click on the **Open** option to browse for a virtual machine.

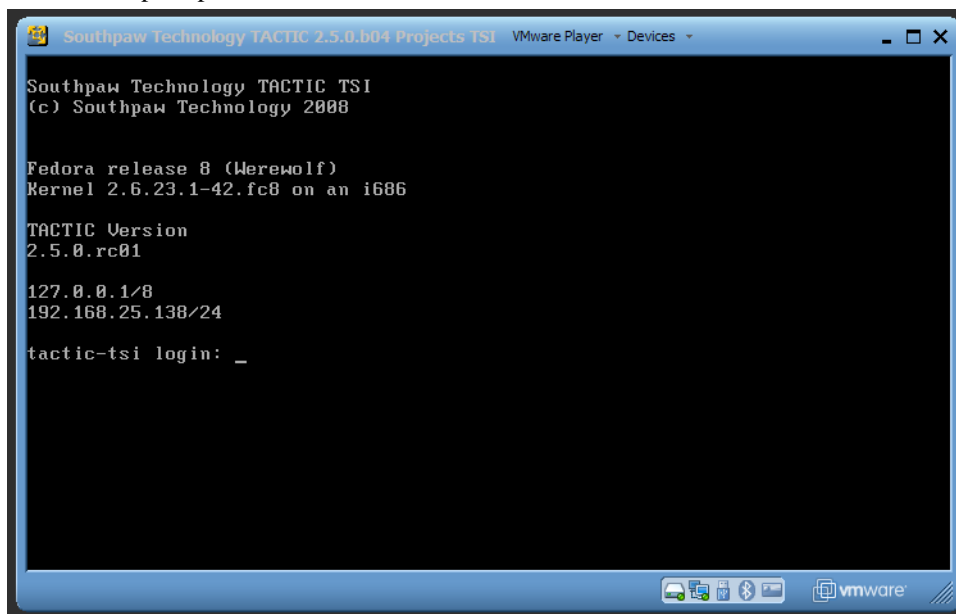


Browse to where the unzipped VM is. Open the TACTIC\_VM\_3.8.0.v04.vmx file. The TSI will start up in the VMware Player.

When you first start the VM, you are presented with a window asking whether the virtual machine was moved or copied. Click the "I copied it" button.



Start-up messages scroll by after the Linux kernel boots in the VM window. After the boot-up is completed, you will see this prompt:



If you see this prompt, the TACTIC VM has started up correctly. If it does not show an IP address (for example, a number like "192.168.25.138"), it means the virtual machine has not picked up an IP address from a DHCP server. This IP address is required, so you must contact your IT department to fix this situation. (Refer to the Troubleshooting Section.)

Write down the IP address and any names you see such as "localhost.localdomain". (You will need this information in a next step.)

## Expanding Disk Space on the VM

In special evaluation situations, there is a requirement for more disk space than has been allocated for a standard evaluation (i.e. a large amount of assets are to be stored, then the TSI "assets partition" can be expanded.

Steps to expand disk space on a VM

### 1. Shut down TACTIC

To shut down TACTIC, issue the command

```
service tactic stop
```

2. Unmount the "TACTIC" drive

```
umount /home/apache
```

3. Run the logical Volume expansion tool

```
lvextend -L+2G /dev/mapper/VolGroup00-LogVol100
```

This example command resizes the logical volume by +2 G, as seen in the command itself. The volume can be expanded to the total size of the virtual disk.

4. Run the filesystem consistency checker to make sure the filesystem is ok

```
e2fsck -f /dev/mapper/VolGroup00-LogVol100
```

5. Resize the filesystem on the logical volume

```
resize2fs /dev/mapper/VolGroup00-LogVol100
```

6. Re-mount the "assets" drive

```
mount /home/apache/assets
```

7. Restart TACTIC

```
service tactic start
```

## Security Notes

To make your evaluation easier, the TSI uses passwords that are easy to guess and a Samba share. This could cause security issues, so your IT department must be aware of your use of the TSI.

### Tactic Samba Network Details

<b>Workgroup</b>	Southpawtech
<b>Machine</b>	TSI 2.0.0
<b>Share</b>	Tactic



<b>Share User</b>	Apache
<b>Share Password</b>	south123paw

## Re-installing/Resetting the VM

If at any point during the usage of the VM there is a need to reset the VM back to its original state, simply delete or archive the directory with the TSI data, and re-expand the zip file that was downloaded from the community site.

## Congratulations!

Your TACTIC VM server is set up.

Contact your TACTIC Representative for support details at [support@southpawtech.com](mailto:support@southpawtech.com)

## Moving VM Data

To transfer data from one VM to another, you need to do the following:

1. In the old TSI VM shell:

```
cd /home/apache
```

```
pg_dumpall -U postgres -c > tactic_database.sql
```

2. In your host machine assuming windows, start a new window of Windows Explorer in the address, type in:

```
\\<your old VM IP address>
```

when prompted for uid, password, type in :

```
apache
```

```
south123paw
```

navigate into the apache folder, you should see the file **tactic\_database.sql**, **assets folder** and **projects folder**

3. You need to move the old VM's **tactic\_database.sql**, **assets folder** and **projects folder** to the same location of the VM you just downloaded and installed.

Same as above, open a new windows explorer, but type in the new VM IP address and carry out the copying

4. In the new TACTIC VM shell, assuming you have copied the **tactic\_database.sql**, **assets folder** and **projects folder** in the new IP from the VM, Type in:

```
dropdb -U postgres sthpw
```

```
psql -U postgres < tactic_database.sql
```

5. Upgrade the TACTIC database in the VM according to the version you are upgrading to
6. Now you can just shut down the old VM by closing the VMware player window

## TACTIC VM Troubleshooting

### Network Troubleshooting

1. The IP address does not show up when I start up the VM.

It is possible that an IP address was not assigned because your host machine is not connected to a network. Or, you have a special network configuration that may require one of the following settings:

- Network with DHCP: bridged
- Network without DHCP: NAT
- No network: host-only

### *Changing Windows Special Network Configurations*

In the top right corner of your VMware player, click on the down arrow beside the Ethernet button and choose **host-only**, **NAT**, or **bridged**. Make sure the **Connected** menu item is checked.

### **Changing Linux Special Network Configurations**

In the top right corner of your VMware player, right-click on the Ethernet button and choose **host-only**, **NAT**, or **bridged**. Make sure the **Connected** menu item is checked.

If the problem persists, refer to the VMware Player documentation by pressing F1.

## **2. I do not remember the IP address of the VMware virtual machine.**

In the VMware player, run the following command in the shell:

**ifconfig**

The IP is the internet address; for example, "192.168.14.101."

### **Refreshing the IP Address**

If you change the Ethernet settings, you may need to restart the network card in the VM. First, you will need to know its number: run the command **ifconfig** in the VM shell. You should see a name similar to "ethX", where X is the arbitrary number of the interface. To restart "ethX", run the following commands:

**ifdown ethX**

**ifup ethX**

## **TACTIC Service Troubleshooting**

### **1. I get a proxy error in my browser that looks like the following:**

```
Proxy Error

The proxy server received an invalid response from an upstream server.
The proxy server could not handle the request /POST /tactic/admin/ <http://192.168.14.113/
tactic/admin/>/

Reason: *Error reading from remote server
```

This message tells you the TACTIC service has stopped. If you are running other processes on port 80 (for example, Skype), this can cause a problem with the TACTIC service. Stop the conflicting service. Then restart TACTIC in the VM by logging in as root and running the command:

**service tactic start**

# Client Setup

## Client Computer Setup Requirements

The following are requirements for a client using TACTIC.

### **TACTIC Temp Directory Creation**

TACTIC needs to be able to create the TACTIC temporary directory. TACTIC uses this directory as scratch pad space to store temporary files.

The location of this directory depends on the client operating system:

- Linux: **/tmp/sthpw**
- Windows: **C:/sthpw**
- Mac OS X: **/tmp/sthpw**

### **Set environment variables**

#### **\$TACTIC\_ASSET\_DIR**

This environment variable is used to point to the root of `asset_base_dir` (the directory where assets are stored). This value defaults to `"/home/apache/assets"` in the TACTIC server. On Windows machines, this path is usually mapped as a letter drive (for example, `Z:\`) or as a UNC path (for example, `\\server\volume\directory\`). This environment variable is set by the server on the client machine during loading if it does not already exist.

On a per-project basis, you can set the project setting with the keys `"win32_client_repo_dir"` and `"linux_client_repo_dir"` so one project can have its asset directory mapped to Drive Z: and another mapped to Drive T:.

### **Browser Plugins**

TACTIC uses the Java plugin in many cases to communicate with the client computer's operating system. This plugin is mostly used in application integration to pass files through the client web browser to and from the TACTIC server.

To download the latest version of the Java plugin, go to **<http://www.java.com>**