Journyx Technical Document

System Administration and Disaster Recovery Guide For **Journyx / Journyx PX** version 11

Document Version: 4.0 (September 2017)
For product versions prior to 11.0, please see an earlier version of this guide.

The latest version of this document is always available at:

http://community.journyx.com/product-documentation/

Introduction

In general Journyx does not require significant systems administration attention. It is a turn-key system and can be downloaded and installed complete with database and web server. Once the product is up and running, especially with the built-in database option, administrative overhead is low. However we recommend you put a full disaster recovery strategy in place once the system is up and running but *before* an emergency happens such as a system hardware or disk failure, or a natural disaster at your site such as a flood, fire, or tornado.

This document is intended to give System Administrators an overview of the application infrastructure and a few tips on how to diagnose the occasional problem, tweak certain system parameters, as well as how to design and implement a disaster recovery strategy.

This version of the document is for both Windows and Linux based systems. Linux is the only Unix-like operating system supported. Journyx 11 only supports 64 bit operating systems on both Linux and Windows.

The latest version of this document is always available at:

http://community.journyx.com/product-documentation

Direct Database Modification

There are two options for manipulating the database or performing administration outside of the interface provided through the Journyx Administration Web Interface and command line tools.

One is to use the jxAPI XML/SOAP/WSDL programming interface. See the link on the product Sitemap page for the latest jxAPI documentation.

The other is to contact Journyx for Professional Services for help in meeting your needs. For information on Journyx Professional Services, contact your Journyx Sales Representative. http://journyx.com/contact-us

Under no circumstances should you attempt direct database manipulation on the Journyx database. Doing so can void your Maintenance Contract for any problems caused by the alterations. Read-only access to the database is allowed for the purposes of external reporting software. Please read the Security chapter of this document for more details about external SQL reporting.

Support

The Journyx website has developer resources and commonly requested documents at the Support page at http://community.journyx.com/support .

Support is also available via the public knowledgebase and product documentation:

http://community.journyx.com/support/knowledgebase

http://community.journyx.com/product-documentation

Additional support is available via the help desk for paid customers:

http://community.journyx.com/support (Select Helpdesk from the menu under the Support tab.)

If you have further questions, you can contact support@journyx.com via email or through the online helpdesk link above.

General Architecture of the Application

The application server uses a typical three-tier web architecture – a front-facing web server, a back-end SQL database, and an application server in between which runs business logic. The client side is a common web browser such as Chrome, Microsoft Edge, or Internet Explorer (version 11 recommended), or Firefox. The browser communicates to the application via a standard HTTP Web Server. In the case of Linux installs, the provided web server is Lighttpd, but you can run it with any web server which supports external TCP based FastCGI servers, such as Nginx or Apache with mod_proxy_fcgi. The FastCGI protocol is used to communicate

between the web server and the separate Python application server processes (sometimes called "daemons".) These daemons manage the database connections and use the HTTP form data, application logic and database records to process the request. The result is channeled back through the web server and then to the client's web browser.

Under Windows you can run under either the Microsoft IIS web server or else the included Lighttpd server[1]. When running Lighttpd it uses FastCGI to talk to the "daemons." When running under IIS, the daemons are managed directly by IIS in an Application Pool environment. An ISAPI plug-in is used to run Python inside the application pool. IIS is the recommended web server for Windows deployments.

In addition to the 3 major components listed above – a web server, a database server, and the application service, Journyx also uses a central data caching system called "memcached" (memory cache daemon) to speed up certain aspects of the application. Journyx supplies an internal copy of memcached that is used automatically and reserves (by default) up to 256 MB of memory for this purpose. However you can use an external memcached process under your control. This process can reside on the application server host, or on a different host where it can use a greater share of memory. Configuring an external memcached is described below as well as how to change the amount of memory the internal memcached uses.

Journyx recommends you use external components where possible for the database server, the web server, and the memcached server. On Linux these are provided by operating system packages that receive regular security updates from the OS vendor.

The Journyx application logic is implemented in Python modules found in three main directories. Another directory is used as a stepping point for using the command-line interface (CLI) to the application to perform manual starting and stopping of the application and other administrative tasks.

The tables below shows a few directories that the System Administrator should be aware of and gives a short explanation of their purpose.

Linux Directory Layout

All paths are from the install directory where the jtinstall script was directed to place the installation, which is saved as the $WTHOME environment variable in the setup file.

Location	Purpose
$WTHOME/pi/bin	Location of the setup file and CLI tools
$WTHOME/pi/pylib/timesheet	Application Framework modules
$WTHOME/pi/pylib/cgi	Application "Screen" modules
$WTHOME/pi/pylib/wtlib	Application library modules
$WTHOME/tmp	Journyx logging directory
$WTHOME/pi/www	Lighttpd root directory
$WTHOME/pi/htdocs	Web server static files
$WTHOME/pi/www/logs	Lighttpd logs
$WTHOME/pi/db/data	PostgreSQL data directory
$WTHOME/pi/db/serverlog	PostgreSQL log file
$WTHOME/pd/Linux/python/bin/python	Python language executable

`pi/bin` is the directory where most system administrative tasks are performed. The file in that directory called "setup" contains system environment variable values that should be in the install users environment whenever performing operations with the CLI such as `backupdb` and `restoredb`. CLI operations must only be performed under the user id that installs Journyx. You can source the setup file in the install user's `~/.profile` or `~/.bashrc` or equivalent, or simply source the file prior to performing any system maintenance as the installing user.

[1] Other FastCGI configurations are possible under Windows but are not covered by this document.

```
cd <install directory>/pi/bin
. ./setup
```

That's a dot, then a space, then dot slash setup. Or alternatively,

```
source <install directory>/pi/bin/setup
```

Usually it's easier to add the sourcing of the setup file (the above command) to a shell profile file such as `~/.bashrc` so you don't have to remember to do it every time you log into this account. You should do this under the Linux account where you installed Journyx. On Windows everything is keyed off the `%WTHOME%` environment variable instead.

`cgi, timesheet` and `wtlib` under `$WTHOME/pi/pylib` are the directories where the application logic Python modules reside. In the event that a patch is required for a Journyx software problem, the likely resolution will involve replacing a module in one of these directories. Do not attempt to manipulate any files in these directories without the direction of Journyx Support. Normally all patches are provided with an installer script which copies the files to the right directories.

`SavedReportFiles` and `jtfs, special` directories used to save user information in previous releases are no longer used as of Version 8.9 See the notes on the `restoredb` command below for more information.

Windows Directory Layout

The product is installed to `c:\Program Files\Journyx` by default. That location is saved as the `%WTHOME%` environment variable. There is no "sourcing the setup file" under Windows. The following directory locations are relative to `%WTHOME%`.

Location	Purpose
jwt\bin	Location of the setup file and CLI tools
python\python.exe	Python language executable
jwt\timesheet	Application Framework modules
jwt\cgi	Application "Screen" modules
jwt\wtlib	Application library modules
jwt\tmp	Journyx logging directory
LightTPD	Lighttpd web server root directory
jwt\tmp\lighttpd	Lighttpd web server logs
jwt\htdocs	Static web server files
pgsql_data	PostgreSQL data directory
jwt\tmp\pglogs	PostgreSQL logs

`%WTHOME%\jwt\bin` is the directory where most system administrative tasks are performed. A link to open a command prompt in this directory is installed under the Start → Journyx menu.

Logging Locations

Care should be taken with logging since unlimited growth of any log file can cause problems. A log rotation strategy is strongly advised. Journyx 11 now comes with log rotation and compression enabled by default, except for the special `audit.log` file. See the section below for more information about logging configuration.

There are three locations where log files may be found in order to help diagnose problems.

`$WTHOME/tmp` is where Journyx logs diagnostic and audit logging. On Windows the directory is `%WTHOME%\jwt\tmp`. The logs that may need rotating here are the `audit.log` and if diagnostic logging is enabled `journyx.app.log`.

By default the application is configured to always log messages with priority of `WARNING` or `ERROR`. You can enable additional logging to help with problem diagnosis by changing the logging level to `INFO`. This will cause significantly more information to be logged with each request, including any SQL queries that were run. There is also a separate `journyx.network.log` which contains jxAPI request and response logging, and a `journyx.email.log` that contains a record of emails sent out by the system.

Lighttpd web server logs are found in `$WTHOME/pi/www/logs` on Linux and `%WTHOME%\jwt\tmp\lighttpd`. Both the `error_log` and `access_log` are kept there.

If the default PostgreSQL database is used, its logging is kept in `$WTHOME/pi/db/serverlog` on Linux, and at `%WTHOME%\jwt\tmp\pglogs`.

The installation process on Windows writes two separate logs:

- The Windows Installer log at `%TEMP%\JournyxTimesheetSetupLog.txt`. This file logs the basic setup.exe installation process. If this process fails, please send that log with your support request.
- The "Setup Web server and Database" script, which runs after the Windows Installer process reboots your computer, has a separate log at `%WTHOME%\IntegrationLog.txt`.

Administrative Topics

Installation Notes

Important note: If are you are currently running with an earlier version of Journyx and plan to migrate your existing data then it is absolutely critical that you follow the proper migration steps to preserve your existing data and assure a smooth transition to the new Journyx version. Please read this web page before continuing:

http://community.journyx.com/Files/Upgrading_to_11x.pdf

If you do not follow the migration instructions, your critical Time and Expense data may become unavailable or lost!

To avoid interruptions in service, Journyx strongly recommends that you install the new version of Journyx on a separate machine. This will leave your production site available online while you test the new site. You should also use a separate database user/schema if using an external database connection. Leave your production database intact until the migration to the new version is 100% complete.

System Hardware and Software Requirements

For a minimal installation, for instance to see a sample install of the application and with the DB and application on a single machine, 4 GB or more is strongly recommended and a **64 bit OS is required**. Quad core or better hardware is also strongly recommended. For production installs please see this page for more detailed hardware recommendations for application servers and database servers.

http://community.journyx.com/product-documentation

If the machine will be hosting other web sites or applications besides Journyx then the system resources will need to be increased appropriately. If you have any questions please email support@journyx.com.

You should also know that Journyx provides Journyx in a Cloud or SaaS (Software as a Service) model where the application is hosted on Journyx servers and accessed through a secure SSL Internet connection. If hardware resources or system administration resources are a concern then you might want to discuss this option with your Journyx sales representative and have Journyx take care of all of this!

Operating System Requirements

Journyx 11 only supports 64 bit operating system editions.

Journyx recommends the use of a server-level Microsoft OS such as Windows Server 2012 R2 for deployment in your enterprise Journyx solution, or alternatively an enterprise level Linux system such as Red Hat Enterprise Linux (RHEL) version 7. Installation to a desktop edition Windows operating system is only recommended for demonstration or testing purposes. All versions of Windows and other operating systems may be used as clients to access the software through a web browser.

Journyx requires one of these Windows platforms to install:

- Windows Server 2012
- Windows 10

See also the “Additional Requirements for Microsoft Windows Servers” section below.

For Linux we currently recommend Red Hat Enterprise Linux (RHEL) version 7 or higher, or the equivalent CentOS version. There are a number of different binary distributions of Journyx available for Linux – in general these are labeled with a “glibc” system library version that they should match up to. For instance RHEL 5.5 uses glibc version 2.5, and so the Journyx version for glibc 2.5 should be used there. There are several other versions of Journyx available for different Linux distributions and glibc versions, including On Linux, you only need “root” access if you intend to run the web server on a privileged port such as 80. Otherwise the software can run under purely user-level permissions.

For RHEL 7 and higher the currently recommended edition of Journyx 11.x is the one labeled Linux_x64_glibc_2.17_RHEL7. Please see the “External FastCGI” section below for configuration instructions.

Additional Requirements for Microsoft Windows Servers

Web Server: On Windows, Journyx recommends using Microsoft Internet Information Server (IIS) as the web server for Journyx. This feature can be found on your Windows installation media. Please see the "Configuring the Web Server" section below for details. The Lighttpd web server is included as an alternative and is fully supported. However if IIS is installed, Lighttpd cannot run on port 80 unless IIS is configured to not use that port.

Permissions: You must have local Administrator rights on the Windows system to install Journyx. Your user must be a member of the local Administrators group or its equivalent. **Journyx highly recommends that you create a dedicated local administrator account and use that account to install and manage the application. Backups, patch and maintenance installs and general administration can only be performed by the installing user. To protect against problems when an installing user is not available in the future, avoid installing with a personal administrator account.** Once installed under IIS, the application normally runs under a dedicated Application Pool identity automatically generated by the system. When installing patches or updates to Journyx, you should be logged into Windows using the same user account that you originally installed with (the “install user” account.)

Database Drivers: If you wish to use a Microsoft SQL Server database connection, you must install either the **SQL Native Client 2012** drivers, or the MS ODBC 13 drivers, on the Journyx server. You must use at least the **2012** version of Native Client drivers, as mentioned below in “Configuring the Database on Windows”, or else use MS ODBC 13 or higher.

External Database Setup

Journyx requires a relational database to store your Time and Expense information. You may either use the provided enterprise-ready PostgreSQL database, or you may supply your own external database server. Journyx strongly recommends using an external server and taking advantage of their security updates.

Journyx provides an "Internal Database" option for Windows. The feature is selected by default and installs the PostgreSQL open source database. During the "Setup Web Server and Database" program (which runs after you install Journyx and reboot) it will ask you whether you want to use the provided internal database or instead select an external database.

Anyone who wishes to use an external database such as PostgreSQL, Oracle or SQL Server must follow the instructions on this web page before installing. This will tell you how to configure your external database. These are general instructions that apply to all database types – you must also read the instructions for your specific platform linked below.

General Instructions (All Platforms) – Read First

Platform Specific Instructions

The currently supported external databases for Journyx v11 are:

- Microsoft SQL Server 2008 or higher on Windows Servers only.
  - Note: SQL Server 2000 and 2005 are no longer supported.
  - Note: you must install the **SQL Native Client** drivers for Microsoft SQL Server **2012** on the Journyx server. You can use the MS ODBC 13 drivers. See "Configuring the Database on Windows" below for more info and download links.
  - Microsoft SQL Server Detailed Instructions

- Oracle 10g or higher on Windows or Linux servers
  - Note: Oracle Instant Client 11.2 (or higher) for 64 bit is required.
  - Oracle 10g or higher Detailed Instructions

- PostgreSQL 9.4 or higher on Windows or Linux servers.
  - Journyx recommends using the version of PostgreSQL provided with your operating system vendor (e.g. RHEL.)
  - Detailed PostgreSQL Instructions

Note: Neither IBM DB2, nor MySQL are supported at this time.

Linux Installation Notes

You will download or receive a .tar.gz file containing the appropriate binary for your Linux system keyed to the glibc version. You can check your system's glibc version by running:

```
$ ls –la /lib/libc.so*
```

If you see something like this:

```
lrwxrwxrwx 1 root root 11 2010-08-27 09:58 /lib/libc.so.6 -> libc-2.7.so
```

Then you have glibc version 2.7.

For Red Hat Enterprise Linux (RHEL) version 7 the currently recommended edition of Journyx 11.x is the one labeled Linux_x64_glibc_2.17_RHEL7.

Create a user on your Linux system dedicated to running Journyx. For instance, create a user account named "journyx". **Journyx highly recommends that you create a dedicated account and use that account to install and manage the application. Backups, patch and maintenance installs and general administration can only be performed by the installing user. To protect against problems when an installing user is not available in the future, avoid installing with a personal account.**

If you are planning to use an external database or external web server (Apache) then make sure those systems are configured and available before doing the install. Reference the relevant section of this document for information on setting up those systems: External Database Setup **or** External FastCGI web server (Apache) on Linux **sections for those set up instructions.**

When external systems are configured you should log onto the system as the Journyx installation user. Now "untar" the installation file. You will end up with a directory called "jtime". Change into this directory and run the install script:
A

```
$ cd jtime
$ ./jtinstall
```

Then follow the interactive prompts. You may also run `./jtinstall --help` for a help screen listing available options. If you don't give these options you will be prompted about them. These are the most commonly used options:

`--path <directory>` Install location. This will become your $WTHOME.

`--postgresql <DBURL>` Specify an external PostgreSQL database connection. See below for DBURL format.

`--oracle <DBURL>` Specify an external Oracle database connection. See below for DBURL format.

`--port <PORT>` Use the given port as the web server port. Special Note: If you are using an external web server (e.g. Apache, Nginx) you can specify a port of 80 or 443 since the port is managed externally. If you do this and you are using the default internal memcached server you will need to edit the <install_directory>/pi/bin/setup file to assign the MEMCACHED port to a non-privileged port above 1024. You will have to do the same for the PGPORT if you are using the internal PostgreSQL. You will need to change that port in the setup file as well as change the port in the DB_URL in the <install_directory>/config file.

`--license <KEY>` Enter a license key obtained from your Sales Representative.

`--externalfcgi <PORT>` Allow an external web server using the given FastCGI port number, e.g. 9091.

`--externalmemcache <HOST:PORT>` Use an externally managed memcached server at host:port. A typical value for a local memcached server would be `--externalmemcache 127.0.0.1:11211`

The DBURL describes the database connection. For both external database choices (PostgreSQL and Oracle) they follow the exact same format. The whole thing must be double-quoted. Port is optional.

```
  --postgresql "username/password@//host:port/instance"
  --oracle "username/password@//host:port/instance"
```

For instance, assume you had an Oracle server running on the default port on the host `ora.company.com`. The Oracle Service Name is "orcl" in this case, and your username/password is scott/tiger. The DBURL would look like:

```
--oracle "scott/tiger@//ora.company.com/orcl"
```

If you select the internal PostgreSQL database option, you will be prompted for a database password. This password will be required for all connections to the database. See the Security chapter of this document for more information about internal PostgreSQL security.

It is possible to use the local domain socket for the PostgreSQL connection instead of TCP/IP. Local (aka Unix domain) socket is the default configuration for many PostgreSQL installs. It is also possible to use ident (Linux account) authentication with no password. Only the default path for the domain socket may be used. Here is a sample DBURL which connects to PostgreSQL over the default local socket on port 5532, using ident auth, the database named "Journyx Production" and the DB username of "journyx":

```
--postgresql "journyx/@///Journyx Production"
```

External FastCGI web server on Linux with Apache, Nginx, etc.

You can use any web server on Linux that supports TCP-based FastCGI connections, including Nginx, Apache and Lighttpd. The FastCGI functionality may be provided by a module such as `mod_proxy_fcgi` (for Apache) and that must be enabled in the server configuration. A few sample configurations are given below.

First make sure your web server is installed and running at a basic level – for instance that you can view a sample index.html file included with it. Journyx strongly recommends that you obtain a security certificate and configure your web server for TLS / SSL / https mode first (see the Security Issues section below). Make sure the deflate module is either disabled or else only enabled on specific locations / resources. Journyx recommends that you use the web server packages provided by the operating system where possible and stay current with their security updates. This also applies to the database and memcached packages.

Before you begin, make sure a FastCGI module such as `mod_proxy_fcgi` (for Apache) is installed and enabled for your web server[2]. Find and read the installation instructions for the FastCGI module appropriate to your web server. For example, `mod_proxy_fcgi` docs for Apache 2.4 can be found here. Note that the `mod_proxy_fcgi` module is provided by the main httpd package on RHEL7 and does not need to be downloaded separately.

If using Apache make sure that both `mod_proxy` and `mod_proxy_fcgi` are enabled in your server configuration. For example on RHEL 7 check that the file exists and is enabled in Apache's module config as follows. This module should already be installed by the base `httpd` package on RHEL. Check for the file:

```
ls -l /usr/lib64/httpd/modules/mod_proxy*
```

It should list both `mod_proxy.so` and `mod_proxy_fcgi.so`

Make sure these modules are enabled in `/etc/httpd/conf.modules.d/00-proxy.conf`

```
LoadModule proxy_module modules/mod_proxy.so
LoadModule proxy_fcgi_module modules/mod_proxy_fcgi.so
```

[2] The currently recommended module for Apache is `mod_proxy_fcgi`. Other modules like the old `mod_fastcgi` may work but must support external TCP-based FastCGI. However the newer `mod_fcgid` does not currently support that. Nginx and Lighttpd typically support proxying to TCP/IP FastCGI out of the box.

When you install Journyx using the `./jtinstall` script described above, you will have to use the `--externalfcgi <PORT>` option. Pick any port (not currently in use) above 1024 such as 9091 for the FastCGI service. You will need to enter that port into the web server configuration file virtual host specification.

URL Configuration

There are at least 4 possible ways to configure the Journyx web application URLs: (here shown with the required `/jtcgi` part for application URLs.)

1) As a virtual host, with no URL prefix:
   `https://journyx.example.com/jtcgi/...`

2) On an existing/shared site, with a URL prefix (`DOCUMENTROOT=/journyx/`):
   `https://www.example.com/journyx/jtcgi/..`

3) Less commonly, with a virtual host AND a URL prefix:
   `https://journyx.example.com/journyx/jtcgi/...`

4) Or on a shared site without a special prefix.
   `https://www.example.com/jtcgi/...`

   In this case, several URLs within the site will be reserved for Journyx:
   `/jtcgi`, `/jtime`, and `/icons`. Please note that future versions of Journyx may use arbitrary URLs under the document root, thus requiring either a URL prefix (document root) or a virtual host and thus ruling out option 4 above.

Apache Configuration with mod_proxy_fcgi

In the following example, we will add Journyx to the virtual host configuration for your secure web server in the httpd.conf file using this template. In the first example we will put Journyx on a shared site using a URL prefix of `DOCUMENTROOT=/journyx/`.

```
<VirtualHost  _default_:443>
...
Alias "/journyx/jtime" "/home/journyx/jx/pi/www/htdocs"
Alias "/journyx/icons" "/home/journyx/jx/pi/www/htdocs/image"
RedirectMatch "^/journyx$" "/journyx/jtime"

# may need enablereuse=on instead depending on version
ProxyPassMatch "^/journyx/jtcgi.*?$" "fcgi://localhost:9091/" disablereuse=off

<Directory /home/journyx/jx/pi/www/htdocs>
  Require all granted
</Directory>

</VirtualHost>
```

Here is an example where Journyx is on a dedicated virtual host, with no URL prefix:

```
<VirtualHost  journyx.example.com:443>
...
Alias "/jtime" "/home/journyx/jx/pi/www/htdocs"
Alias "/icons" "/home/journyx/jx/pi/www/htdocs/image"
RedirectMatch "^/$" "/jtime"

# may need enablereuse=on instead depending on version
```

```
ProxyPassMatch "^/jtcgi.*?$" "fcgi://localhost:9091/" disablereuse=off

<Directory /home/journyx/jx/pi/www/htdocs>
  Require all granted
</Directory>

</VirtualHost>
```

Replace 9091 with the FastCGI port number you picked above. Replace `/home/journyx/jx` with the installation location from the `./jtinstall` script.

You must also ensure that the "deflate" module is either disabled or else configured to exclude the Journyx CGI directory /jtcgi. The Apache deflate module will interfere with the compression that Journyx provides internally. This may result in the site being inaccessible, especially on certain browsers. The deflate module compresses content so it uses less bandwidth to transfer to the end user. If all of your users are on a LAN (local area network) then the deflate module may not provide any significant benefit. However if some of your users are accessing the site through the public Internet, then deflate may provide enhanced performance. However you must take care that the /jtcgi directory is excluded as that provides its own compression.

To completely disable deflate across the entire site, run this Apache configuration command:

```
a2dismod deflate
```

If you wish to leave deflate enabled, you must ensure that the /jtcgi virtual directory is excluded. Typically to do this you must edit deflate.conf (often found in /etc/apache2/mods-available) and comment out the AddOutputFilterByType line. This will disable deflate globally. You must then edit each Location directive of your other apps or resources and add a similar line, such as:

```
<Location /myotherapp>
    AddOutputFilterByType DEFLATE text/html text/plain text/xml
</Location>
```

Make sure that deflate is not enabled under the /jtcgi location.

Finally, make sure that httpd will run with appropriate permissions to allow the web server to access the Journyx install location and files. One way to do that is to add group membership to the apache user sufficient to match the group ownership of the Journyx install files. Also make sure that the the user that httpd runs under has access through the full path to the Journyx installation directory. If SELinux is enabled, a few extra steps mentioned in the "Installing Journyx …" section below may need to be taken.

Nginx configuration for FastCGI

Instead of Apache it is also possible to use other web servers that support the TCP version of the FastCGI protocol, such as Lighttpd or Nginx. Here is are some example Nginx configurations. The first example uses a global URL prefix `DOCUMENTROOT=/journyx/` Also be sure to replace 9091 with the actual FastCGI port you chose, and replace `/home/journyx/jx` with the actual WTHOME install location.

```
server {
...
    location /journyx/jtime {
        alias /home/journyx/jx/pi/www/htdocs;
        index  index.html;
    }
    location = /journyx {
      return 301 /journyx/jtime;
    }
```

```
    location /journyx/icons {
        alias /home/journyx/jx/pi/www/htdocs/image;
    }

    location ~ \/journyx/jtcgi/.*?$ {
        fastcgi_param SERVER_SOFTWARE Nginx;
        fastcgi_param REQUEST_METHOD $request_method;
        fastcgi_param REQUEST_URI $request_uri;
        fastcgi_pass 127.0.0.1:9091;
    }
}
```

In this next sample, we are not using a URL prefix, and therefore require several top level locations to be reserved.

```
    location /jtime {
        alias   /home/journyx/jx/pi/www/htdocs;
        index  index.html;
    }

    location /icons {
        alias /home/journyx/jx/pi/www/htdocs/image;
    }

    location ~ \/jtcgi/.*?$ {
        fastcgi_param SERVER_SOFTWARE Nginx;
        fastcgi_param REQUEST_METHOD $request_method;
        fastcgi_param REQUEST_URI $request_uri;
        fastcgi_pass 127.0.0.1:9091;
    }
```

Installing Journyx on RHEL 7 with Apache or Nginx

The following is a quick walk-through of an installation of Journyx on RHEL7 (or CentOS 7) using external Postgresql, Apache or Nginx, and external memcached. This example largely assumes Apache over Nginx, but most steps are the same. Refer to the Nginx configuration section above if using that.

First step is to create a separate user account for Journyx. This will be known as the “install user”. All patches and upgrades and other Journyx system commands must be run as this user. Do not install Journyx under your normal user account.

```
$ sudo adduser journyx
```

Also decide the installation path for Journyx. This example will use `/home/journyx/jx`. This path is known as WTHOME.

Next install the required packages (here using Apache):

```
$ sudo yum install memcached postgresql-server postgresql-contrib httpd mod_ssl
```

Configure Memcached:

```
$ sudo vim /etc/sysconfig/memcached
```

Check the PORT number as you will need this later. Set CACHESIZE to something appropriate to your server. 1024 would allocate 1 GB of RAM to this memory cache. Suggested minimum size is 512.

Make sure memcached is running and started on boot:

```
$ sudo systemctl restart memcached
$ sudo systemctl enable memcached
```

Check the status of memcache:
```
$ sudo systemctl status memcached
```

Set up PostgreSQL
Complete instructions for configuring and maintaining a PostgreSQL (PG) database instance are beyond the scope of this document. Here is a very quick summary:

Create a new PostgreSQL database cluster:

```
$ sudo postgresql-setup initdb
```

Next you will want to configure authentication (e.g. enable md5 in pg_hba.conf) as desired. You may need to enable access for the Journyx system account (install user). You can use ident authentication with the Journyx system account.

```
$ sudo vim /var/lib/pgsql/data/pg_hba.conf
```

Then make sure PG is running

```
$ sudo systemctl start postgresql
$ sudo systemctl enable postgresql
```

Log in as the postgres user and create a PG user account for Journyx.

```
$ sudo -i -u postgres
-bash-4.2$ createuser --interactive
Enter name of role to add: journyx
```

Answer “n” to the other prompts.

Now you’re ready to log in as the Journyx install user and run the installation program:

```
$ sudo -i -u journyx
```

Download and untar the installer somewhere (e.g., `/home/journyx/`). Decide the WTHOME installation directory, e.g. `WTHOME=/home/journyx/jx`

Change directory into the un-tarred installer (jtime) and run the installer (check the --help option for details). In this example we’ll use the above paths and port 9091 for the FastCGI application server. We’ll set the HTTP port to 443 here because we’ll use TLS / SSL security.

```
./jtinstall --path /home/journyx/jx --postgresql "journyx/password@//dbhost/journyx" --port
443 --externalmemcache 127.0.0.1:11211 --externalfcgi 9091
```

This PostgreSQL setting can be used for local socket (non-TCP) and no password (ident auth):

```
./jtinstall --path /home/journyx/jx --postgresql "journyx/@///journyx" --port 443 --
externalmemcache 127.0.0.1:11211 --externalfcgi 9091
```

Follow the prompts as it tests the database connection. When it's successful, you should get a message like:

> Journyx has successfully installed!

Point your web browser to http://journyx.example.com:80 to see it
in action.

You can login initially as the user 'journyx' (password 'journyx').
Please change your user password immediately.

Additional documentation for this release can be found in:
/home/journyx/jx/doc

At this point, the app server itself is set up but the web server front-end still needs to be configured before you can access the site. Whether you are using Apache or Nginx, refer to the appropriate section above.

On RHEL7, the SELinux security features are enabled by default. The default settings can interfere with letting the web server communicate with the FastCGI application server. The following commands will allow the web server to make a network connection, and give visibility to the web documents directory. Be sure to substitute the correct WTHOME path.

```
$ sudo chcon -R -t httpd_sys_content_t /home/journyx/jx/pi/www/htdocs

$ sudo /usr/sbin/setsebool -P httpd_can_network_connect 1
```

At minimum, the Journyx installation directory needs to be readable by the web server user. One way to do that is to add the journyx install user to the apache group. Replace `apache` group with `nginx` where appropriate.

```
$ sudo usermod -a -G apache journyx
```

Every directory on the path to the htdocs directory must be group readable and executable. If the install directory (WTHOME) is `/home/journyx/jx`, then htdocs is:

```
/home/journyx/jx/pi/www/htdocs
```

Every component in that path must be group readable and executable. Typically the home dir `/home/journyx` would not be by default, so fix that:

```
chmod g+x,g+r /home/journyx
```

And change the group to the Apache group:

```
chgrp apache /home/journyx
chgrp -R apache /home/journyx/jx
```

Completing installation on Linux

It is usually a good idea to add the following statement to a login script for the Journyx install user like `~/.bash_profile` (replacing the WTHOME install path):

```
source /home/journyx/jx/pi/bin/setup
```

Depending on your exact configuration, you may need to run some commands to tell Journyx that the web server is using SSL:

```
$ sudo su – Journyx
$ . pi/bin/setup
$ setkey HTTP_PORT=443
$ setkey HTTPS_STATUS=on
```

Also if using a global URL prefix on the web server, be sure to set DOCUMENTROOT appropriately with a trailing slash:

```
$ setkey DOCUMENTROOT=/journyx/
```

Make sure memcache is working:

```
$ pi/bin/checkcache
```

Once the configuration is complete, restart the web server (e.g. Apache) and attempt to access the Journyx site at the `/jtime` URL, e.g. http://journyx.example.com/jtime)

Please also read the entire section marked “Security” below as many of these items apply to external Apache web server setups. In particular read the sections on enabling SSL and also disabling the HTTP TRACE / TRACK verbs.

Windows Installer Digital Signature

Journyx digitally signs the Journyx for Windows installer files for your protection. The digital signature is checked when you run the installer and Windows prompts for administrative access through the UAC (User Access Control) prompt. You can manually check the signature at any time. The purpose of the signature is to detect any alteration in the setup file, whether by accident (data corruption from network issues) or by malicious behavior.

To check the digital signature, simply locate the installer file in Windows Explorer (or My Computer on your desktop) and right-click on it. Click on "Properties". Click on the "Digital Signatures" tab in the Properties dialog. Click on the entry for Journyx, Inc. then click Details.

If the file is clean (unaltered) it will say "The digital signature is OK." If any part of the file has been altered or corrupted it will say "One of the countersignatures is not valid. The file may have been altered." If you see that, contact Journyx Support immediately and obtain a new copy of the installer. Do not use an installer whose signature does not validate.

Windows Installation Notes

Journyx strongly recommends rebooting your machine before installing Journyx. This may avoid problems with previous installations of other products that never completed. In addition, if you have an old version of Journyx installed, you must:

1. Make a backup file with `backupdb` (described below)
2. Uninstall the old product
3. Reboot the system
4. Delete the old Journyx directory (save your backup file somewhere), such as `C:\Program Files\Journyx` or in some cases `c:\Program Files (x86)\Journyx`
5. Install the new version.
6. Run the `restoredb` program to restore your data.

You must uninstall any old version of Journyx, including Journyx versions 9 and 10, and reboot before installing the new version as described above. Be sure to perform a backup of your data with the "backupdb" command. If you are running an external database such as Microsoft SQL Server, you should also perform a "native" database backup from its manager program. Be sure to reboot the server as directed after uninstalling the old version, before you run the new installer.

The Journyx installer includes a 'Quality Feedback' feature. This feature sends installation "milestone" information to the Journyx web site as a simple web page request to help Journyx evaluate installer quality and to identify areas of technical concern.

No personally identifying information is collected or transmitted by the Quality Feedback feature. The feature may be disabled by un-checking the box on the first screen on the Installer.

After the installer is complete, you will be required to reboot your computer. You have the option of rebooting later, but you cannot use Journyx until you reboot. When you reboot and log in, the installer will run a final setup action that initializes Journyx. This action will run only once, and you must complete it before you can use Journyx.

This setup action will launch a script (console) window to configure your web server and database for Journyx. This script can be run at any time by clicking Start → Programs → Journyx → Setup Web Server and Database.

Configuring the Web Site on Windows

About Web Server choices

Journyx is a web application and therefore requires a web server to run. Journyx recommends using the Microsoft Internet Information Server on the Windows platform. Journyx does **not** provide IIS; it is available on your Windows installation media. See below for installation instructions for IIS.

As an alternative, Journyx provides the open source Lighttpd web server. This allows you to run Journyx without IIS and is fully supported. However if IIS is also installed, Lighttpd may not be able to grab the default web port (80) and must be installed on a different port. IIS configuration can also be changed to not use port 80.

If the "Setup Web Server and Database" program detects that you do not have IIS, it will automatically use Lighttpd. If you install IIS at a later time, you can rerun this program to choose IIS. You can switch back and forth without affecting your actual Journyx data.

Installing IIS

To install IIS, first obtain your Windows installation media. Note that IIS version 6 or higher is required.

Once you have your Windows installation media, go to Start → Control Panel → Add / Remove Programs. Then select 'Add / Remove Windows Components.' The exact location of the IIS feature may vary depending on your operating system. If you have any doubt, please contact your system administrator or support@journyx.com.

In addition to the core WWW server component, you must install the following IIS components that are not enabled by default:

- ISAPI Extensions
- IIS Metabase and IIS 6 configuration compatibility

This component is not required, but highly recommended:

- Dynamic Content Compression

This feature is used in lieu of the GZIP_ENCODING=Yes setting used on Lighttpd. The GZIP_ENCODING setting has no effect when running under IIS – content compression is enabled or disabled through the Dynamic Content Compression feature of IIS.

Installing Journyx to an IIS server

IIS can serve multiple separate web sites, possibly on different network addresses or ports. Journyx will only install on an **existing** IIS site. If you want Journyx to be served from a particular port number, you MUST first configure a web site with that port. Journyx is not capable of creating a new IIS web site for you; it can only install to an existing site.

Note that only certain editions of Windows allow you to create multiple web sites. If you only have one web site available, the Journyx Integration will NOT prompt you for a web site. It will automatically select the only available site. If multiple sites exist, you will be prompted to select the site for Journyx.

Journyx will create three new virtual directories on your chosen web site:

- `/jtime` (static files)
- `/icons` (images)
- `/jtcgi` (application scripts)

Note that you cannot have any other applications on that web site that use virtual directories of that name, particularly `/icons`.

Please note that future versions of Journyx may use arbitrary URLs under the document root. Please configure your site to use a virtual host (separate web site) dedicated to Journyx as described here.

You may remove Journyx from a web site at any time by simply deleting these virtual directories in the IIS Administration tool. You can then re-run the Integration script (see above) and select a new web site where Journyx will live.

There is only one IIS-specific configuration option you should be aware of. That is the “Maximum Worker Processes” setting of the Journyx Application Pool. As the name implies this controls the maximum number of worker processes (daemons) at any one time. This is the number of requests that can be simultaneously handled – any additional requests are put into a queue (line) and serviced as worker processes become available. By default this is set to 8 processes plus 4 for each additional CPU in your system. Idle worker processes are automatically stopped by IIS. You can set this to as much as 20 processes per CPU but setting the number too high may cause excessive memory usage.

To change this setting, open the “Internet Information Services (IIS) Manager” program from Administrative Tools or Computer Management. Open Application Pools then select the Journyx pool and select Advanced Settings. Maximum Worker Processes is under the “Process Model” category.

Installing Journyx internal web server on Windows

If IIS is not available on your system, or if Journyx is unable to install to IIS for some reason, it will fall back to using the included Lighttpd web server.

Lighttpd server does not have any configuration options except for network port. The normal HTTP (web server) port is 80.

However if that port is in use, then you will be prompted to select an alternate port (defaulting to 8080.) If any port besides 80 is selected the URL used to access Journyx must include the port number. This is true for IIS as well. For instance,

```
http://your-server:8080/jtime
```

In any case, this program will create a shortcut file with the correct address/port for Journyx. You will find it under Start → Programs → Journyx → 'Journyx (login)'.

Note that the Journyx internal web server always binds the given port on ALL available network interfaces; if you need to limit Journyx to a specific network interface then you must use IIS.

Once the web server is set up, the program moves on to set up the database connection.

Configuring the Database on Windows

Be sure to read the requirements and other information in the “External Database Setup” section of this document above before installing to an external database.

If the Internal Database feature is selected, the only option to configure is a password for the database itself. If using the internal database, please also read the “Internal Database (PostgreSQL) account security” section in the Security chapter of this document.

If using an external database, you will be asked which type (SQL Server, Oracle, or PostgreSQL) and the connection information. Supported database versions are listed in the section above.

You must use SQL Native Client drivers version 2012 or higher, or MS ODBC drivers version 13 or higher. You can download the SQL Server 2012 Native Client drivers from this link:

http://www.microsoft.com/en-us/download/details.aspx?id=29065

Click on “Install Instructions”. Search for “Native Client” until you find the section titled “Microsoft® SQL Server® 2012 Native Client”. Chose the X64 Package. After the download completes, run the installer on the Journyx server. If necessary, go to Start → Journyx → Setup Web Server and Database.

Journyx uses ODBC to connect to SQL Server. You can either create a pre-defined ODBC connection, known as a System DSN or Data Source Name, or you can just enter the connection information directly without creating a System DSN. After you select the SQL Server option in the setup program, you will be shown a list of existing DSNs. You can either choose an existing DSN, or chose the special “(None)” option to fill in your connection info directly.

Connecting to an external PostgreSQL or Oracle database does not require any special drivers. Just provide the usual connection information such as host, port, database name, username and password.

Configuring your Journyx data

After your web site and database are configured, the Integration script will ask you if you want to set up a new 'clean' Journyx site with the default initial configuration, or if you wish to cancel. Either way, you can always restore a site from an existing backup file later by opening the Journyx Command Prompt and running `restoredb` as described in the Disaster Recovery section below.

You can also click Cancel at this point, and nothing will be done. It will not modify the database at all, but your Journyx site will not work correctly in most cases. This option should only be used when following instructions from Journyx Support.

Multiple Application Servers (Clustering)

From time to time, a single application server may not be robust enough to serve all customer needs. Journyx products support multiple application servers talking to the same database back-end with some custom configuration. This allows you to scale up the number of users by adding additional hardware.

Clustering Overview

The most common configuration consists of multiple physical machines (servers):

1) One or more web servers, typically Apache running `mod_proxy_fcgi`. The web servers are mostly used to serve static files such as images. Often a single web server is sufficient even for a very large install.
2) One or more memcached servers. Please note that multiple memcached servers only increases performance in some limited scenarios, and does not provide enhanced uptime or failover capabilities.

If a single memcached server in your cluster is offline, this may severely impact performance across the entire app cluster. In general we recommend all customers run a single memcached server instance unless directed otherwise by Journyx Support.

3) One or more application servers with shared network storage for the WTHOME install. The application servers should be the most powerful systems with the best CPUs available as these systems perform the bulk of the application work.
4) A database system, which may be internally clustered or have fail-over systems. Configuring a clustered database is beyond the scope of this document; please consult your DBA and/or database vendor training. When running in a clustered environment (multiple app servers) you must run an external database instance; in other words, you cannot use the "internal" copy of PostgreSQL when using multiple app servers.

Understanding the Journyx Installation

Journyx and Journyx PX install fully into a single directory known as %WTHOME% (on Windows) or $WTHOME (on Unix) (hereafter referred to as WTHOME). This is usually C:\Program Files\Journyx\ on Windows and the user-specified directory (usually under the user's home directory) on Unix variants.

Note: This document assumes that you are talking to an external database server (PostgreSQL, SQL Server or Oracle) and not using the internal PostgreSQL database which ships with Journyx products.

Beneath WTHOME are several directories of interest.

WTHOME/pd and WTHOME/pi contain product libraries and logic files which can either be shared (via NFS, DFS or similar) or installed separately on each application server.

WTHOME/doc contains product documentation files which can either be shared (via NFS, DFS or similar) or installed separately on each application server.

WTHOME/tmp contains temporary files and ongoing logs used by the Journyx products**. This directory MUST be shared among application servers. This directory CANNOT be configured.**

There are 2 files of interest within WTHOME itself: config and config.lock. These files tell the Journyx products "how to run," and **MUST be shared among application servers.**

Additionally, Journyx products utilize memcache server technology. For a shared installation such as this, you will be required to talk to one or more external memcache servers.

Installing on Multiple Application Servers

Installation of Journyx products to multiple application servers is relatively-simple.

1) Setup a shared directory on your network which your multiple application servers can access which will be where you install the Journyx product (WTHOME directory).

2) Install an external memcached server (memcached.org) on your network where the application servers can talk to it. It is acceptable to use Journyx internal memcached server on one of the application server(s). If you have multiple servers available to dedicate to memcached, you can run one memcached on each server. For large (>1000 user) installations it is recommended to have at least one server fully dedicated to memcached.

3) Install your Journyx product on a single application server to an external database server per standard product instructions to the directory noted above. On Windows it is often best to map that shared directory to a "network drive."

4) Install your multiple-application-server license key as provided by Journyx Accounting.

5) Repeat step 2 on each application server, installing to the same directory.

6) NOTE: When you have completed this, you must select the "master" machine for the purposes of running Journyx-based "scheduled tasks" (cron). Pick a single application server to be the "master" and run this command to enable cron: setlocalcron --on

7) In the event that the cron host is offline for more than a couple hours, setlocalcron can be run to transfer the function to a different machine.

8) Once completed, stop each application server and modify the WTHOME/config file line which says:

MEMCACHED_SERVERS=1.2.3.4:11211

to have the IP:Port of your accessible memcached server. If this line does not exist in your config file, increment the number at the top of the config file by 1, and add the line to the bottom of the file. If you are using more than one memcached server, the addresses of all servers should be comma separated.

Please note: as mentioned in the Security section of this document, please ensure that your firewall is configured to deny any TCP/IP connections to the memcached servers other than from the Journyx app servers.

9) Restart the application server(s).

Multiple Application Servers on Windows

Running multiple application servers on Windows is mostly the same but there are a few differences to note.

1. All patch upgrades including Support hotfixes will need to be installed separately on each node in the cluster.
2. In addition the `/jtcgi` virtual directory under IIS must be set to have Anonymous Authentication where the identity of the Anonymous User is set to "Application Pool Identity". Normally this is done for you automatically but you can check that in the IIS Manager.
3. If you use Windows Authentication to connect to your SQL Server database in a Windows Domain site, you will also need to add `domainname\machinename$` (for each machine in the cluster) to the list of authorized accounts inside SQL Server Manager. If you are NOT using Windows Domains, you'll need to add `IIS AppPool\Journyx` to the list of authorized SQL Server users.
4. You must ensure that "Cron" (scheduled tasks within Journyx) is only running on a single server. The setting `RUN_LOCAL_CRON=<servername>` must be in the config file on all servers. The value of `<servername>` should be the one server where Cron will be run. E.g. "apphost01".

Load Balancing

Using the example above, let us say that we installed a Journyx product to 3 application servers.

a) The installation directory is a shared network directory which all 3 application servers can access with full control, and it is mapped to "J:"

b) The application servers are named "appl1," "app2," and "app3."

c) Your domain is mydomain.com

Now that you have completed the steps above, anyone who can acces:

http://app1.mydomain.com or http://app2.mydomain.com or http://app3.mydomain.com can talk to the same Journyx installation which talks to the same back-end database server.

However, if app1 and app2 are unavailable, this installation would require your users to know that and to choose to connect to app3.mydomain.com to have an available application server. Journyx also supports "sitting behind" a load balancer with some minor configuration changes.

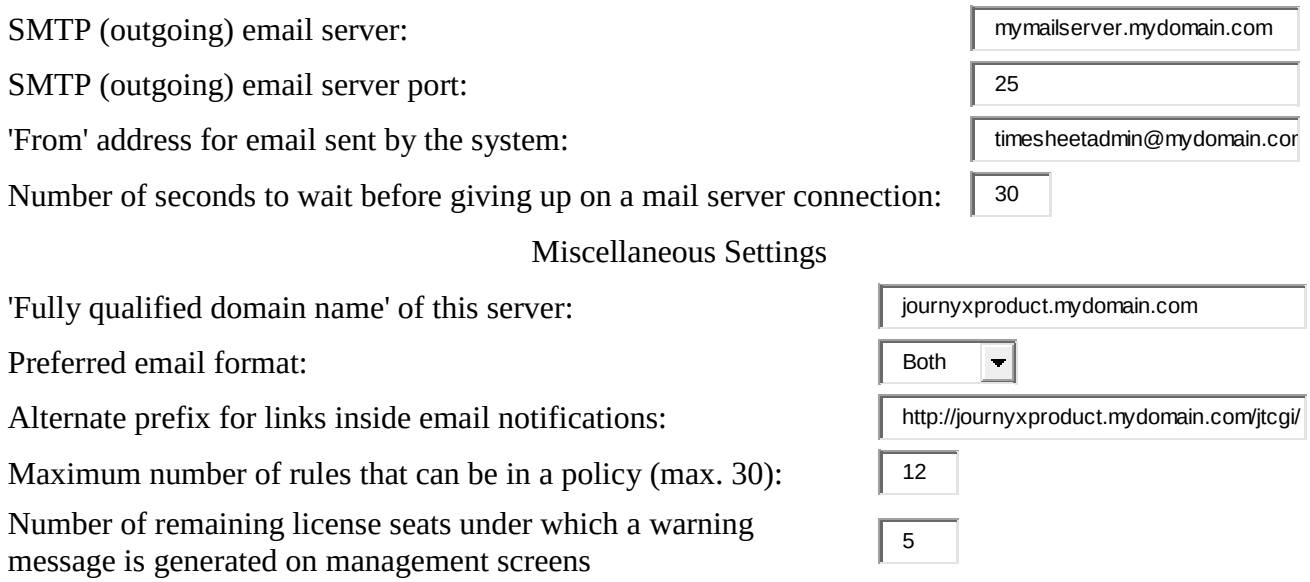
Understanding Load Balancing

Using the example above, you would install a “load balancer” to act as your “virtual server,” where your 3 “real servers” are app1, app2 and app3. For this example, we will name the load balancer “journyxapp.mydomain.com”

When your load balancer is properly configured, a user requests a resource from journyxapp.mydomain.com, and the load balancer takes the request from there, routing it to one of the 3 available application servers, depending on the rules you have configured.

Configuring Journyx products to properly report URLs

Sometimes in emails or product links, Journyx products will provide HTTP addresses for ease of use. In the example above, your FQDN would be set to app3.mydomain.com (assuming you installed app3 last). Behind a load balancer, however, you would want those links to say “journyxapp.mydomain.com” instead. This is configurable within the Journyx product under System Settings → Server and Email. An example of these configuration settings is shown below.



Easier installation on Unix variants

If you are using a Unix variant rather than Windows, and you are sharing WTHOME via NFS or similar, the installation can be simplified greatly. Please note that you must still run an external database in this situation; you cannot use the “internal” PostgreSQL install provided by Journyx when using multiple application servers.

1) Install your external memcached server and configure and start it per documentation.

2) Install your Journyx product to the shared directory using the --externalmemcache IP Address:port syntax for your external memcache server and the external database flags per Journyx installation documentation.

3) Test the installation

4) On server 2, if you are using a local user (as opposed to LDAP, NIS or similar), create a user named the same as the user on the first application server with the same UID (user ID).

5) Mount the shared directory in the same location

6) Start the Journyx application server on the second application server.

Security Issues

General Security Issues

To ensure the continued secure operation of your Journyx web site, there are a few simple steps that you should take. As with all software, security is achieved by presenting as few opportunities as possible for unauthorized access to your systems. Your IT staff should be familiar with configuring firewalls and other tasks required to implement secure networks and web services. You should keep your operating systems and other software components (especially external web servers and databases) up to date with the vendor's security patches.

The most important security step to take is to ensure the Journyx server is only accessed through secure HTTPS encrypted channels. In general we recommend running the Journyx web server exclusively on your intranet (internal corporate network). Off-site or external users who need to access your Journyx site over the public intranet should use a secure encrypted VPN (virtual private network) solution to first connect to your intranet, and from that access the Journyx site. We strongly recommend using TLS / SSL security (see below) and locking down the application server as much as possible.

In particular, make sure that only the secure public web server port (443 for https/SSL) responds to connections from the public Internet. Your firewall solution should be configured to block all other requests. In particular the other TCP based services that Journyx depends on, such as the internal PostgreSQL database, and memcached, should not be allowed by the firewall to accept connections from the outside.

If using an external memcached server, it is essential that you read the "Important Security Note for External Memcache" section below.

Internal Database (PostgreSQL) account security

Journyx requires a password to be set on the PostgreSQL system when using the internal database option on either Windows or Linux at installation or patch-upgrade time. This new prompt does not apply if you connect to an external PostgreSQL system maintained by you (in which case a password was already required). The password you select is automatically applied to both the standard "journyx" account and to the read-only "jxreport" account. You must select a single password for both accounts at installation time but you may change the password for either account later with the "changedbpw" command-line program.
The password will be required for all connections to the internal PostgreSQL server. The password is stored in a lightly-encrypted format in the $WTHOME/config file. That file should normally only be readable by the OS install user. If you forget the password and need to retrieve the plaintext version, you can run this command as the OS install user:

```
$ python -c "from wtconfig import options; print options['e_DB_PASSWORD']"
```

Although a read-only reporting account named jxreport is created automatically for you, by default you can only log into this account from the same local machine for security reasons. If you wish to grant external reporting access to a different host, please follow the instructions below.

Remember you can use the changedbpw command at any time to change the password for either the main account (journyx) or the reporting account (jxreport). Use `changedbpw -h` to see detailed help info. If you are using an external database connection, changedbpw only changes the stored password in the Journyx config files, not the actual password on the external DB account.

However if you're using the internal PostgreSQL database, the changedbpw command changes both the stored password and the actual 'journyx' account password in PostgreSQL. Use the `changedbpw -R` option to change the actual account password of the jxreport read-only external reporting account. The Journyx application server does not directly use the jxreport account.

External Reporting

Many users will wish to provide direct external reporting access to the Journyx SQL database. For instance, you can write you own customized reports using a third-party product like Crystal Reports. It is possible to use the main database account that the Journyx application server uses. However this practice is not recommended because that account has read/write access and could accidentally modify, overwrite or destroy critical data due to a programming or security error. Journyx does not support, recommend, or allow direct database modification. Performing a direct database modification could violate your support contract with Journyx and render your site inoperable.

Instead, Journyx recommends creating a dedicated read-only account for external reporting access. This account should be set up by your DBA (Database Administrator) and granted only read (SELECT) permissions on all Journyx tables and views. The exact procedure depends on your database system and version and should only be performed by a DBA who possess sufficient knowledge of database security fundamentals. Consult your database system vendor's documentation for further details on granting read permissions to other users.

External Reporting and the internal PostgreSQL database

A read-only external reporting account is automatically created for you as described above when using the internal PostgreSQL database option. However this account can only connect to the PostgreSQL server from the same local host by default for security reasons. To enable true external reporting from a different host, you must take some additional steps to grant access.

A. Make PostgreSQL listen on external network interfaces. By default the internal PostgreSQL only listens on the localhost (127.0.0.1) interface for security reasons.
   1. Find the postgresql.conf file.
      a. On Linux this is in `$WTHOME/pi/db/data/postgresql.conf`
      b. On Windows this is in `%WTHOME%\pgsql\data\postgresql.conf`
   2. Edit the postgresql.conf file in a text editor (using a programmer's editor like vi, Emacs, Notepad++ or similar is recommended.)
   3. Search for "listen_addresses". You will probably find it on a commented-out line.
   4. If there are no instances of a non-comment listen_addresses line, add a new line that looks like the following. If there is already a non-comment listen_addresses, modify it to look like this:

   ```
   listen_addresses =  '*'
   ```

   That will listen on ALL network interfaces. You may instead want it to only listen on a specific network interface (i.e, your intranet network.) In that case change it to list the IP address of the correct interface, such as:

   ```
   listen_addresses =  '192.168.1.5'
   ```

   You can also use a comma-separated list of interfaces. The exact location of the line within the file is not critical, but you may consider putting it just above the commented-out listen_addresses sample.

   5. Save changes in the postgresql.conf file and exit the editor.
   6. While you are in here, note the port= line. You will need this later to connect. On Windows the port is usually 5532 but on Linux the port varies depending on which ports you selected at install time.
   7. You can either restart the PostgreSQL server now (see below) or wait until editing the pg_hba.conf file in step 2 below.

B. Edit the pg_hba.conf security file to allow remote connections over the jxreport account. This file controls who is allowed to connect to which database.

1. Locate the pg_hba.conf file.
    a. On Linux this is in `$WTHOME/pi/db/data/pg_hba.conf`
    b. On Windows this is in `%WTHOME%\pgsql\data\pg_hba.conf`
2. Edit the pg_hba.conf file in a text editor.
3. There are comments near the bottom of the file that tell you what to do. Follow these instructions. Generally you will add a line like this:

```
host    journyx         jxreport         192.168.1.100   md5
```

This sets a **host** based access role allowing access to the **journyx** database on the **jxreport** account using an **md5** encrypted password from the client host **192.168.1.100**. Usually the only thing you need to change here is the IP address of your external reporting client; i.e, replace 192.168.1.100 with the actual IP address of your reporting host. If you need to enable multiple report clients, you can either create a separate line for each host (updating the IP address as necessary on different lines) or else you can use a single line with an IP netmask to allow a range of addresses. For instance the host specification 192.168.1.0/24 will allow all machines on the 192.168.1.x network to have access.

This page has complete documentation on the pg_hba.conf file:

http://www.postgresql.org/docs/8.3/static/auth-pg-hba-conf.html

C. Now that you have told PostgreSQL to listen on external network addresses and have added appropriate access rules, you must restart the PostgreSQL service to have the changes take effect.
    a. On Linux, simply run the command `wstop; wstart`
    b. On Windows, open the Services control panel. Typically you can do this via Start → Run → services.msc or find it under the Control Panel → Administrative Tools window. Find the service named **PostgresqlJournyx** and right-click it and select Restart (or Start if not already started.)

D. If the service fails to restart, check that you have the correct syntax in your PG config files. You can check the PostgreSQL service log for error messages. On Linux this is in `$WTHOME/pi/db/serverlog`. On Windows these messages appear in `%WTHOME%\jwt\tmp\pglogs`.

E. You should now be enabled for external access. Before running the main reporting program, attempt to verify a simple connection such as with the ODBC driver or psql command. If your external reporting host is Windows, you may need to obtain a third-party PostgreSQL ODBC driver which is not provided by Journyx. You can obtain one such driver from here: http://pgfoundry.org/projects/psqlodbc/ (Note: Journyx does not warranty or provide support for PostgreSQL ODBC drivers.)

When attempting to connect make sure you use the correct PostgreSQL server port number obtained in step 6 above. You will need these parameters:

- **port**: obtained in step 6 above, default is 5532 for Windows servers.
- **host**: the hostname or IP address of your Journyx / PostgreSQL server.
- **database**: This is always “journyx” for the internal DB.
- **user**: always “jxreport” for the internal DB (version 8.8 or higher) otherwise “journyx”
- **password**: you supplied the password at install or upgrade time. The password may be different on the jxreport account than on the journyx account. The changedbpw can be used to change the jxreport account password. See the section on Internal Database Account security above for details.

HTTP Trace and Track verbs

Most security professionals recommend disabling the HTTP verbs TRACE and TRACK as they are not essential to program operation and may inadvertently reveal configuration information about your server.

The Lighttpd web server provided with the Journyx service automatically disables TRACE and TRACK so there is nothing further to do there.

Microsoft IIS web server also disables these by default. If you have enabled this on IIS you may wish to turn it off. Please consult Microsoft's documentation for instructions.

To disable TRACE and TRACK in Apache versions 2.0.55 or higher, or 1.3.34 or higher, simply insert this line in your Apache configuration file under each virtual host:

```
TraceEnable off
```

Secure Sockets Layer (SSL) configuration

Secure Sockets Layer (SSL) is a feature of your web server that securely encrypts all communications with the end-user. Step-by-step instructions for configuring your web server are beyond the scope of this document. You should obtain and follow the standard instructions for SSL from your web server provider.

For instance, here are instructions for setting up SSL on IIS 7 (Windows Server 2008.)

http://learn.iis.net/page.aspx/144/how-to-set-up-ssl-on-iis-7/

Here is the manual for Apache 2.2 and SSL:

http://httpd.apache.org/docs/2.2/ssl/

You will need to obtain and pay for a security certificate for your organization.

For Apache with mod_proxy_fcgi you would typically have a configuration file section like this:

```
<VirtualHost *:443>
ServerName <SITE>.company.com

SSLEngine on
SSLCipherSuite
ALL:!ADH:!EXPORT56:RC4+RSA:+HIGH:+MEDIUM:+LOW:+SSLv3:+SSLv2:+EXP:+eNULL
SSLCertificateFile /etc/httpd/ssl/host.cert
SSLCertificateKeyFile /etc/httpd/ssl/host.key


Alias "/jtime" "/home/journyx/jx/pi/www/htdocs"
Alias "/icons" "/home/journyx/jx/pi/www/htdocs/image"
RedirectMatch "^/$" "/jtime"

# may need enablereuse=on instead depending on version
ProxyPassMatch "^/jtcgi.*?$" "fcgi://localhost:9091/" disablereuse=off

<Directory /home/journyx/jx/pi/www/htdocs>
  Require all granted
</Directory>
```

```
</VirtualHost>
```

Replace `/home/journyx/jx` with your `$WTHOME` installation path, and <SITE> with the Journyx site name (such as timesheet.mycompany.com) and 9091 with the FastCGI port number from the `--externalfcgi <PORT>` command when you installed Journyx. See the "Apache Configuration" section above for details.

Generating a Self-Signed SSL Certificate

For testing purposes only you may wish to create a self-signed SSL certificate. This allows you to configure and test secure SSL mode without buying a real certificate from Verisign, Thawte, or another Certificate Authority (CA). However a self-signed certificate doesn't provide true security and your users will be warned about an insecure (self-signed) certificate unless you have registered your certificate on their systems. In general, you should only use a self-signed certificate for testing purposes. Here's how to generate a self-signed certificate on a Linux system.

First, go to a working directory where you will store your self-signed certificate.

$ cd $HOME/self-signed-cert

Next, generate a server key file:
$ openssl genrsa -des3 -out server.key 4096

If you do not have the openssl program available, you may need to install it from your Linux distribution.

Now create a server certificate:

$ openssl req -new -key server.key -out server.csr

Answer the questions as prompted. You can edit the default values in /etc/ssl/openssl.cnf

Now sign the certificate making it valid for 365 days.

$ openssl x509 -req -days 365 -in server.csr -signkey server.key -out server.crt

Create a version of the key that doesn't require a password. (Note: make sure no one else has access to this file.)

$ openssl rsa -in server.key -out server.key.insecure
$ mv server.key server.key.secure
$ mv server.key.insecure server.key

Now create the final pem file. This is what you use with a web server like Apache or Lighttpd.

$ cat server.key server.crt > server.pem

The server.pem file can now be used with Apache or Lighttpd. Remember, this is a self-signed certificate and should only be used for testing purposes.

Enabling SSL in Lighttpd on Linux

Journyx provides the Lighttpd "internal" web server with the product installer. Normally this operates in "regular" HTTP mode, but it can be configured to operate in SSL secure mode (HTTPS). However Journyx recommends that for production HTTPS use that you should use either Apache or Microsoft IIS. Journyx provides these instructions for configuring SSL on Lighttpd for your convenience only. SSL cannot currently be used on Lighttpd under Windows. Please also note that using standard HTTPS port of 443 is not currently possible with

the internal Lighttpd – your users will have to include the port number in the URL they used to access the site. If you must use the standard HTTPS port of 443, then you must use either Apache or IIS.

1. Make sure you have Lighttpd 1.4.28 or higher for Linux. You can check the Lighttpd version provided with Journyx by running:
   $WTHOME/pd/Linux/lighttpd/sbin/lighttpd –v
2. Log into the Linux account where you installed Journyx ("install admin" account).
3. Copy your SSL certificate pem file to:
   $WTHOME/pi/www/conf/server.pem
   If you do not have a SSL certificate, you can create a self-signed certificate using the instructions above. However a self-signed certificate should not be used for production servers.
4. Run "chmod 400 $WTHOME/pi/www/conf/server.pem"
5. Stop the Journyx service with the "wstop" command
6. Edit the Lighttpd configuration file at $WTHOME/pi/www/conf/lighttpd.conf
   Insert the following two lines anywhere in the file (at the end is fine):

   ssl.engine = "enable"
   ssl.pemfile = "/home/jtime/jt/pi/www/conf/server.pem"

7. That is assuming your WTHOME install location is /home/jtime/jt; edit the above line with your actual install location.
8. Find the line that says "server.port = ". All users will have to include the port number in the url, like: https://yoursite.example.com:29700/jtime
9. Save changes in the editor and exit the editor.
10. Start the Journyx service with "wstart"
11. Tell Journyx that we are now in secure HTTPS mode with this command:
    setkey HTTPS_STATUS=on

Single Sign On (SAML and Azure Active Directory)

Journyx supports secure Single Sign On, including two-factor authentication (2FA), through several means.

The SAML protocol is supported with the use of the optional Journyx PSAuth module that is not included in the core product. With PSAuth you can use almost any authentication method your web server supports such as Shibboleth or Microsoft Active Directory Federation Services. Please speak with your Journyx sales representative regarding your Single Sign On needs.

In addition, Journyx 11 has built-in support for Single Sign On (SSO) through Azure Active Directory (AAD). If your organization already uses AAD or has an Office 365 Enterprise subscription, then SSO is a good option.

Even if you aren't planning to use SSO, your AAD organization can be linked to Journyx to allow your users to import their calendar and task items. Please see this document for more information on configuring the connection to Azure for SSO or Suggestions (Calendar/Task import):

http://community.journyx.com/Files/Azure_Portal_Registration.pdf

Configuration and Tuning

The master configuration file is kept in the installation directory. Its name is simply `config`. It is advisable to make a backup of this file if you ever modify it and save it as config.save or some other name. If the `config` file is lost due to accidental deletion or corrupted the site will be down until it is restored and restoration is difficult.

Normally changes to this file should be made through the `setkey` command line program. `getkey` can print individual keys or the entire config file.

This file can be edited by hand but you must exercise extreme care in doing so. The first line of the file has a count of the number of lines expected in the file and that number must not change or the file will be considered corrupted. Never edit the file when Journyx is running. Shut down the site before editing the file.

Prior to Journyx Timesheet Version 7.1 all configuration options were specified in the file-system resident config file. In Version 7.1 and later, configuration options with application-wide scope are moved into the database to allow better support for multiple application server instances. Thus, configuration options that remain in the config file apply to the local machine only. Options in the database apply application wide. Database connect information also still resides in the config file so the application can perform the initial database connect at start up.

General Options

Any attempt to manually change the configuration parameters below should be performed under the direction of Journyx Support. As mentioned above, in Version 7 and later, some of the configuration options are kept in the database, and cannot be modified via the config file. For these options the *getkey* and *setkey* command line interfaces can be used to set the configuration variable. Issuing the *getkey* command with no arguments gives a list of the values, along with their current setting.

In general, you rarely need to modify the config file once the site is up and running. Values for the WT_DEBUGLOG, WT_DEBUG and DATABASE_BUSY are controlled automatically in response to administrative actions such as turning on logging in the Journyx Administration interface (Browser interface). The command line operations `backupdb` and `restoredb` which are used to backup and restore (see the Disaster Recovery section below for more information on these) will disable users web access while Journyx backup/restore are performed and set the DATABASE_BUSY flag to do so.

DATABASE_BUSY can also be set via the Journyx Administration Interface when Journyx Administrators wish to perform operations and configuration using the browser interface while locking out general user access. This is accessed by Journyx Administrators via the browser interface Administration/Web Interface Lockout link.

Performance and Memory Options

When running under FastCGI configuration (as with Lighttpd and Apache web servers) there are several important settings that have effects on performance and memory utilization. Running under Microsoft IIS uses a different architecture but has some similar settings described below. FastCGI is a protocol where the web server can communicate with the application server processes (the “daemons.”) The daemons are pre-spawned so they are ready to handle web requests as they come in. The daemons handle the application web requests and generate the responses. The daemons are optimized for performance and cache various objects that improve application response. Running too few daemons can starve the system for workers to respond to burst web requests. Running too many, however may result in excessive memory utilization. Best performance is achieved by a balance of the number of daemons derived through observation of system behavior.

The following 3 FastCGI settings in the config file are the most critical:

```
FASTCGI_MAX_SPARE=<number, default=6>

FASTCGI_MIN_SPARE=<number, default=3>

FASTCGI_MAX_CHILDREN=<number, default=18>
```

These three options work similar in concept to similarly named settings in Apache. `FASTCGI_MAX_SPARE` sets the maximum number of “idle” daemons allowed at any given time. Any extra idle processes (those not actively handling a web request) will be shut down to conserve memory. `FASTCGI_MIN_SPARE` is the minimum number of idle processes. If all of the FastCGI daemons are engaged handling processes, the service will launch additional processes to ensure there are always several idle processes available to handle spikes in traffic. Finally, `FASTCGI_MAX_CHILDREN` controls the upper limit on all FastCGI daemons. It is the absolute maximum

number of daemons that will run at any time. You should only increase that number if you are running at least a quad-core CPU with at least 4 GB of memory.

Please note that increasing FASTCGI_MAX_CHILDREN can increase the number of connections made to your database. If you are using the internal PostgreSQL database you may need to increase the number of allowed connections in the postgresql.conf file. Doing so may trigger additional resource requirements (e.g. SYSV shared memory) and may require adjusting your operating system settings per your vendor's instructions.

Under the IIS web server there are no exactly equivalent settings, but the "Maximum Worker Processes" setting of the Journyx Application Pool controls the maximum number of daemons. See the "Installing Journyx to an IIS server" section above for details.

Other settings:

`MAX_CHILD_REQUESTS=<number, default=2500>` This is the maximum number of web requests that each individual daemon will handle before being restarted. Normally you do not need to change this, but setting to smaller numbers can help keep the caching memory utilization down. In general, it should not be set lower than 1000

`MEMCACHED_MEM=<number of megabytes, default 128>` This is the amount of memory to allocate to the internal Memcached process. This is a shared cache that the daemons use to store working copies of database records and Python objects to accelerate the web site. 128 MB is sufficient any small to medium size site with approximately 200 active users. Larger sites may wish to set this to a higher number, or run an external memcached on a different host. Do not set this number so large that the system begins "swapping" under normal traffic or using the "page file" excessively. Very large sites may need up to 512 MB.

`LOCAL_CACHE_CLEAR_MINS=<number of minutes, default 5>` - this setting determines how often the "daemon" worker processes clear out their local caches. The default is 5 minutes. Sites with very high traffic may need to lower this. The lowest allowed value is 0.

`GC_MINS=<number of minutes, default 5>` - should normally be set the same as LOCAL_CACHE_CLEAR_MINS. This setting determines how often a "garbage collection" call is run which returns unused memory to the operating system.

Configuring External Memcached

Journyx provides an "internal" copy of the memory cache server "memcached". However you can run an "external" memcache either on the same host, or a different host, or multiple hosts. An external memcache server is not started and stopped by the Journyx application service and is under your control. You can either specify external memcache servers during the initial setup (jtinstall script with the `--externalmemcache <SERVER LIST>` option) or by using setkey after the install:

```
setkey MEMCACHED_SERVERS=<SERVER LIST>
setkey EXTERNAL_MEMCACHED=Yes
```

The <Server List> is a comma-separated list of memcache servers in `host:port` format. Note that if you use multiple servers, they are used concurrently and are not treated in a "fail-over" manner. If just one server in the list becomes unavailable, it can make the application perform slowly for everybody.

As of version 8.7, Journyx will automatically reconnect to an external memcache server that restarted or went offline temporarily. In version 8.0 the Journyx service must be restarted whenever the external memcache server restarts.

`setkey MEMCACHED_SERVERS=host:port` Set this to configure an external memcached system using host:port notation, or a comma separated list of servers.

`setkey EXTERNAL_MEMCACHED=yes` should be run on any machine that won't be launching a memcached instance. This setting merely disables the launching of a memcache instance; `MEMCACHED_SERVERS` should also be set.

Please note that the meaning of the `EXTERNAL_MEMCACHED` setting changed between version 8.7m3 and 8.7m3P1 (and 8.7m4 and 8.8). The patch upgrade script should automatically migrate your old setting, if any.

The memcache can run under the same host, or a separate host. If using an external memcached you should ensure that your network is configured such that it isn't available outside your firewall to the general Internet, because memcached doesn't have a built-in authentication or access control mechanism.

The "internal" memcached instance only listens on the 127.0.0.1 (loopback) network interface for security reasons. That means it can only be accessed from the same local machine. If you need to host memcache on a separate machine (other than your Journyx app server) or you have more than one app server host, then you must run an external memcached.

Important Security Note for External Memcached

If running an external memcached, for security reasons you should make sure the memcached host/port is firewalled off from everything except the Journyx app servers. In addition you should make sure your memcached instance only listens on an internal network interface, if you have multiple interfaces. Use the `-l <IP Address>` option (with a lowercase L) to make memcache only listen on the network interface specified by that IP address. This interface must be reachable by the Journyx app server(s) but should be closed off from the public internet.

Content Compression

When running under Lighttpd (on either Linux or Windows) then GZIP compression should be enabled for better performance. Use this command to check the current GZIP status from the Journyx command line console.

```
getkey GZIP_ENCODING
```

Use this command to turn it on:

```
setkey GZIP_ENCODING=YES
```

In the unlikely event that it causes problems with certain older browsers, you can also turn it off:

```
setkey GZIP_ENCODING=NO
```

When running under the Microsoft IIS web server, the GZIP_ENCODING setting has no effect. Instead you can turn the Dynamic Content Compression feature on or off from within IIS Manager.

Database Tuning

Journyx makes no particular recommendations for external database tuning. Your local DBAs (database administrators) should be consulted for operational details. Journyx is designed to be as independent as possible of database particulars. Running the Journyx application on a separate machine from the Database Server can enhance performance. However, except for certain specialized operations, performance is generally limited by available CPU power on the application server more than any other factor such as database performance. So putting the application server on your fastest available hardware is generally the best bet for overall performance.

Logging Changes and Configuration

Journyx version 11 now supports robust options for logging configuration. Here is a summary of changes in logging in v11:

- The old `debug.log` is now named `journyx.app.log`
- The old `soap.log` is now named `journyx.network.log`
    - This now includes all jxAPI endpoints as well as requests to external servers (Exchange).
- The old `email.log` is now named `journyx.email.log`
- The 3 log files mentioned above have a slightly different format for each log line:
  `Timestamp [ProcessID:Priority:Name:User] Message`

- The logs above are, by default, rotated and compressed after reaching a certain size.
    - The default is to rotate files at 50 MB and keep the last 10 rotated logs in gzip compressed format.
    - The Linux commands `zless` and `zcat` can be used to view compressed files. Journyx provides a `zcat` implementation for Windows admins.
- The `audit.log` file name is the same and the format is unchanged because this is used by integrations. It is not rotated or compressed by default.
- Protection against concurrent writers (keeps entries intact)
- Log messages have different priorities.
    - In increasing priority: `debug, info, warning, error, critical`
    - By default, only `warning` and higher are logged to a file.
- Almost all of these logging parameters can be configured as described below. The current configuration can be displayed with the command `show logging`

Logging Customization

Almost all of the logging parameters shown above can be customized by editing the `logging.json` file in the `WTHOME` directory. This file follows a strict JSON format and should be edited carefully. In particular, watch out for trailing commas in lists and dictionaries. The logging configuration is not currently saved or restored in the backupdb format. Important: the Journyx service should be stopped when editing the `logging.json` file. Do not edit the file while the service is running or you may get unexpected results with log rotation.

The main application logging level can be adjusted directly in the administrator web GUI. By default it logs `warning` or higher messages only. Set to `info` for detailed logging, including logging of SQL queries and web requests. All other customizations to logging require editing the `logging.json` file while the service is stopped.

The current logging configuration can be displayed with the `show logging` command. This shows all available options, including default values not necessarily listed in the `logging.json` file. You can pipe this output to a file to use as the basis for a new logging configuration. Be sure to keep a copy of the original configuration just in case.

If you prefer to use your own log rotation tool, you can disable Journyx's built-in log rotation by editing this file. You can also control the log rotation size, number of files to keep, whether to compress rotated files, etc. It is also possible to customize a few specific logging points, such as suppressing SQL logging while keeping other application logging.

Custom Error Handlers

The Journyx application has several static HTML files that are used as content for HTTP response error codes such as “404 Not Found” and “500 Internal Server Error”. These files can be customized to match the desired look of your site or to match your local policies. By default these only apply to error codes arising out of the /jtcgi script directory, not static files in /jtime or other resources on your webserver. To apply either the default Journyx error response content or your customized version to such requests, see the instructions appropriate to your web server below.

There are five customizable responses for /jtcgi resources:

- 400 Bad Request. Certain authentication errors or failed API requests can cause this.
- 401 Unauthorized. The user wasn’t authenticated (logged in), but might be able to access the resource after authenticating.
- 403 Forbidden. The user may be authenticated but is not authorized to access this resource.

- 404 Not Found. The requested resource does not exist or is inaccessible.
- 500 Internal Server Error. The service experienced an unexpected internal error.
- 503 Service Unavailable. The service is temporarily offline but is expected to return later. For instance, the service process is stopped or the database administrator is performing maintenance.

The content of these responses can be found in the htdocs directory (see the Directory Layout section of this document for the location of htdocs). The default response is contained in a file named default*CODE*.html. For example, default404.html for the 404 response. Do not modify the defaultCODE.html files. If you wish to customize these files, copy them to *CODE*.html (for example, 404.html) in that same directory and then modify them. Journyx product updates may overwrite default404.html and related files but will never touch 404.html.

In addition, you may wish to make your web server return these customized responses for similar errors that occur outside of the /jtcgi script directory context.

Apache

For Apache, simply add appropriate ErrorDocument statements to the virtual directory configuration section as shown in the "External FastCGI web server (Apache)" section of this document above. If you have customized the content, link to your version instead of default404.html etc. You can do this for 401, 403, 404, and 500 errors. Be sure to restart your web server after doing this.

Microsoft IIS

For Microsoft IIS, select the website in IIS Manager and then select Error Pages. Find the response codes you wish to change and right-click then select Edit.

Choose "Execute a URL on this site" and put in the URL like:

/jtime/default404.html

Substitute the correct error code for 404. If you have customized the /jtcgi error code responses as above, then instead of linking to default404.html, link to your customized version such as /jtime/404.html

Lighttpd

In Journyx 8.8 and higher, the internal Lighttpd web server is already configured to return the default404.html error response. If you've customized it, or you're on Journyx 8.7 or earlier, you may want to configure this line. Open the lighttpd.conf file in an editor. You can find this here:

$WTHOME/pi/www/conf/lighttpd.conf (Unix / Linux)

%WTHOME%\LightTPD\conf\lighttpd-inc.conf (Windows)

Look for any uncommented lines that have "error-handler-404" in them and delete them.

Now add a line that says:

server.error-handler-404 = "/jtime/default404.html"

Replace default404.html with 404.html if you have customized 404.html. Save changes to the file and restart the Journyx service.

The 404 response is the only one that can be customized under Lighttpd (for resources other than /jtcgi). Custom 401, 403, 500 and 503 responses (outside of /jtcgi) are not available on Lighttpd.

Starting, Stopping and Restarting the Service

Linux Service Control

Starting and stopping the service as well as backup and restore are performed via the command line interface and must be performed when logged in as the install user. When attempting to do any of these operations you must first set the proper environment variables by sourcing the setup file.

```
. ./setup                    # Sets environment variables
backupdb                     # Backs up the installation. (see below for details)
restoredb                    # Restores a backup made with backupdb
wstop                        # Stops the application
wstart                       # Starts the application
```

Note: wstop and wstart only stop the database if the internal PostgreSQL database is in use. If an external Oracle, SQL Server or PostgreSQL database is being used, they must be manipulated using the native DB tools and interfaces.

Windows Service Control

Starting and stopping the "Journyx Timesheet" service on Windows can be done through the normal Services control panel (under Administrative Tools), or otherwise in the Computer Management application. Or you can do it at the command line:

```
net stop journyxtimesheet
net start journyxtimesheet
```

Or from the %WTHOME%\jwt\bin directory, these shortcuts are provided:

`wstop` (stops the Journyx service)
`wstart` (starts the Journyx service)
`wrefresh` (restarts both Journyx and the IIS web server)

The wstop and wstart commands on Windows take optional parameters of extra service names to stop/start respectively, such as `w3sc` for IIS.

Other Command Line Tasks

Aside from database backups and log file rotations, restarting (AKA "Bouncing") the server is the only other CLI administrative task that might be performed on a regular basis. The Journyx server daemons cache database results aggressively both in the daemons and through memcached in order to optimize performance. While the cache is flushed on write, some database configurations may allow the daemons to cache large amounts of data over time. If the daemons acquire too large of a virtual memory footprint there can be danger of termination of the daemons due to ulimits or decreased machine performance due to memory thrashing.

In the event the System Administrator wants to schedule a daily or weekly restart they should schedule cron to restart the site. This cron entry could be used to restart the site at 5:05AM and send mail to the system admin. Note the '.' used to source the setup file.

```
 5 5 * * * . <install_dir>/pi/bin/setup;wstop;wstart | mail -s nightlyRestart
sysadmin@your_site.com
```

Disaster Recovery

This section of the guide is designed to help you formulate and put into action a plan for backup and restore, also known as Disaster Recovery. The idea is that before a disaster strikes, you will already have a plan in place to enable you to quickly recover to a working state and get the application up and running again.

Purpose

This document describes the Journyx database backup and restore utilities including the "Database Archive" feature. These utilities allow you to save your Journyx data to a file on disk and restore it at a later time in case of system failure. You should implement a disaster recovery plan and do backups on a regular basis. These backup files should be stored in a safe place separate from your Journyx server, ideally in a different geographic location. This document explains the different strategies and options for performing backups. All of the command-line options for these utilities are explained in detail along with general documentation and answers to frequently asked questions about backup and restore.

Backup and Restore Summary

To create a Journyx backup, open a command prompt and run the **backupdb** command and give a filename for the backup file:

```
$ backupdb –v My_Timesheet_Data_January2018
```

A file with the name **`My_Timesheet_Data_January2018.jx`** will be created in the current directory. To restore that file at a later time run the **restoredb** command and give the filename for the backup file:

```
$ restoredb My_Timesheet_Data_January2018.jx
```

Please be warned that running restoredb will ***permanently erase*** all data in the site and replace it with the data contained in the **`.jx`** backup file.

The **`–v`** option the backupdb command enables printing of "verbose" status messages. That gives you a better idea of how long the program will take to finish.

You can also create an "Archive" backup file. An archive takes all the time, expense and mileage sheets that fall within a date range that you provide and writes them to a **`.jx`** backup file. You then have the option to purge (delete) those archived sheets from your live Journyx site. The archive file can be saved away in a safe place or restored to an alternate server for reporting on archived data. To create an archive simply give the **`–A`** (capital A for Archive) option to the **backupdb** command. The program will prompt you for the date range and other options.

```
$ backupdb –A Pre_2017_Timesheet_Archive.jx
```

The complete set of **`backupdb`** and **`restoredb`** options are described in detail later in this document.

Disaster Recovery Planning

Any system administrator responsible for a Journyx site should become familiar with the contents of this document and implement an effective data recovery plan. Journyx, Inc. is **not responsible** for the loss of any data for any reason from any system under the care and custody of the customer. Journyx strongly recommends that you backup your Journyx system on a **nightly basis** and maintain backup media and old backup files going back a minimum of one week.

Backups of the Journyx system should occur independently on at least three levels:

- Journyx backupdb format
- "Native" RDBMS / SQL backup
- Operating system level backup

Your recovery strategy should encompass all three levels of backups.

The Journyx backupdb command creates a cross-platform `.jx` backup file that is perhaps the simplest way to perform a backup. However for very large amounts of data, this can also be the slowest way to recover as the restoredb command can take a long time to run. The Journyx backupdb format includes professional services scripts and some other objects not directly stored in the database. We recommend you at least schedule a nightly backupdb command.

Journyx stores all of your Time and Project data in a RDBMS (relational database management system), also known as a SQL database, for example Microsoft SQL Server, Oracle, or PostgreSQL. In addition to the backupdb .jx backup files, it is highly recommended that your I.T. staff perform regular "native" backups of the RDBMS hosting your Journyx data whether you are using the "Internal Database" or an external RDBMS that you have provided, such as Oracle. Complete instructions for performing "native" backups are outside of the scope of this document but some guidelines can be found below.

In addition you should make regular operating system-level backups of the Journyx application server (and the database server, if separate) to ensure the fastest recovery in the event of a total system loss. Remember: in a total loss situation having a copy of the database itself is only one part of the overall recovery strategy. Besides the database itself you'll need a working computer, operating system, network, and an installation of the Journyx server application. Please consider all of those factors when formulating your recovery plan.

Backup Techniques

There are two common methods for making a backup of Journyx data. One method is to make a direct backup of the RDBMS using the native recovery tools provided by your RDBMS software. The other method is to use the **backupdb** and **restoredb** commands provided by Journyx. The "pros and cons" of each backup solution are described in this table with some specific recommendations for a backup strategy following that. In general you should plan on using both strategies to obtain the best level of protection.

A third much less common backup option is to use a disk imager program or other operating-system level tools to create a backup image of an entire hard disk partition. If you use this technique, it is highly recommended that you make additional backups with the Journyx backupdb utility and/or the RDBMS native recovery tools.

Journyx Backup / Restore (Backupdb and restoredb)	RDBMS Native Backup / Restore (also called 'Recovery Tools')
Cross Platform File Format The backup file can be restored on any operating system that Journyx supports and with any type of database system. This is also useful in case Journyx Support needs to look at a copy of your database.	**Non-portable Format** The backup file may only be restored on the same kind of database system – including the same RDBMS version in most cases. You cannot, for example, create a native backup on Oracle and then restore it to a PostgreSQL server.
Automatic Version Migration Backup files from old versions of Journyx can be "migrated" into a newer version with some limitations.	**No Migration** A "native" RDBMS backup file from an old version of Journyx may not be restored to the newer version. It can only be used by a Journyx installation on the same version level as when the original backup was created.
Date Range Archive Supported **backupdb** allows you to select a date range for the backup and to optionally delete these archived records.	**No Archive Feature** No easy or automatic way to archive away records that fall under a certain date range.
Uses Compression The Journyx backup format automatically compresses the data with the popular and reliable ZIP format. The `.jx` files can be opened by most Zip compatible programs and the plain text backup file inside is easily extracted and read by humans.	**No Compression by default** The native backup format of RDBMS's are typically not compressed by default though often the option will be available. Compressed backups can take up as little as 10% of the original file size.

Site must be offline to backup While a backup is being made with the **backupdb** tool, the Journyx site is offline and unavailable to your users.	**Online ("Hot") Backups** Most RDBMS's allow you to safely perform a backup while the site is in active use. Sometimes this is called a 'hot' backup. This increases site availability.
Relatively Slow Journyx version 8 improved **backupdb** and **restoredb** speed significantly but a backup of a very large site can still take as much as 30 minutes or more. The **restoredb** program is very slow compared to most RDBMS native restore programs. The speed is improved in version 8 but still relatively slow. A very large site can take hours or even several days to restore. The best way to make the restoredb faster is to have fewer records in the first place; in particular, try to avoid activating the "historical custom fields for time records" feature unless absolutely necessary. It is also a good idea to use the "Archive" feature on a regular basis (see below) to trim out unneeded old data. This will make your ongoing backups and any restore operations much faster.	**Very Fast** RDBMS native backup and restore operations are typically very quick. Usually they are limited only by disk input / output capabilities.

As you can see from the table above, the two major disadvantages of the Journyx backup format are that it is slow compared to native RDBMS recovery utilities and that the site must be offline to make a backup. (The site must be offline for a restore as well, even if you are using the RDBMS Recovery Tools.) The slower restore time compared to a native RDBMS restore may mean that your site is unavailable for longer periods of time while restoring.

Recovery Strategy

If your I.T. staff is capable of understanding and effectively using the native RDBMS recovery tools we recommend that you use these on at least a nightly basis in addition to making weekly backups in the Journyx native **backupdb** format. The backup process should be completely automated if possible.

If you prefer not to use the RDBMS recovery tools we do suggest that you make a Journyx native backup at least once a day. Again this will usually be at night or during non-peak hours. Even if you plan to use the RDBMS recovery tools exclusively we recommend that you make Journyx native backups at least weekly. You may choose a minimally disruptive time to perform the backup such as a weekend night. Automated backups are ideal for that. (See the "Automating Backups" section below.)

One important point to remember when planning your recovery strategy is to never make the current backup overwrite a previous one, especially if that previous backup is your only recent backup. Always backup to a **new** file. Ideally the filename should contain the current date and time as a convenient way of keeping the files distinct.

You can store the backup files on any media that is convenient for your staff whether DAT or other tape formats, recordable optical formats like DVD-R, external hard drives or network storage that is backed up by a separate process. The Journyx backup utility cannot normally write directly to a tape or DVD-R. You must first create the

backup file on disk, then you can copy that **.jx** file to tape or other backup media. Journyx backups can be written directly to network shares provided that the appropriate access permissions are in place.

If you reuse your backup media, it is recommended that you keep 7 days worth of backups as a bare minimum. It is also highly recommended that you make a full backup in the Journyx format at least monthly and store that backup in a safe place off-site (away from your place of business) in case of a fire or other disaster at your office. This is good advice for all of your business data, not just the Journyx database.

The rest of this document describes the Journyx native backupdb and restoredb utilities. A section at the end of the document does have some additional technical notes about performing native RDMBS backups.

Backup Procedures

Journyx provides the **backupdb** command-line utility to perform backups. The files that backupdb creates have the **.jx** extension. A **.jx** file is a bundle of files compressed in the common "zip" archive format. These files contain your Journyx database tables as well as other objects, such as professional services scripts and your site `config` file.

Running backupdb

To run backupdb on Windows, launch a command window by clicking:

```
Start → Programs → Journyx → Journyx Command Line Prompt
```

Then you may simply type **backupdb** plus any option you need (see below) as well as the name of your new backup file.

On Unix, before you run **backupdb** or any other Journyx command line utility, make sure you have sourced the Journyx setup file first. To perform a backup on Unix, you must be logged in as the same account that was used to install Journyx.

For example, if Journyx runs under the **journyx** user, and is installed in the `/home/journyx/jtime` directory, log in as journyx and do this:

```
~:$ cd /home/journyx/jtime
```

That directory is also know as **$WTHOME** since it is your installation directory.

```
~/jtime:$ source pi/bin/setup
~/jtime:$ backupdb -v MyBackupFile.jx
```

The **.jx** backup file is always written to the current directory, unless you specify the full path to the output file, such as:

```
~/jtime:$ backupdb -v
/netshares/BackupVolume/2010/September/Timesheet_20100905_backup.jx
```

Please note: when you run **backupdb**, it will automatically take your Journyx site offline. If any of your users attempt to access the site while you are making a backup, they will get a "Site is Offline for Maintenance" message until the backup completes. Please note that your Journyx service must be running in order to make a backup if you are using the “Internal Database”. Use **wstart** to start the service on Unix or use the Services control panel under Windows.

If the backup fails due to lack of disk space or for any other reason it will prompt you at the console whether or not to remove the database busy flag. Saying “yes” will put the Journyx site back online. If you are running the backupdb command through an automated process such as a timed "at job" or "cron job" this may render your

site offline if your script is unable to answer the prompt about the database busy flag. See the section below about automated backups.

backupdb options

These options may be given to the **backupdb** command. In addition to the options listed here, you must provide a filename for the output backup file. If you do not give the filename a **.jx** extension, it will be added automatically. For instance, if you type:

```
$ backupdb myfile
```

A backup file named **myfile.jx** will be created.

The "Archive" options for date range based backups are listed separately in the next section.

```
-? or --help   Show the usage screen
```

This option displays a short screen describing the rest of the options.

```
-v             Show verbose output
```

If you do **not** give this option, the backupdb command is silent. It will not print any output or progress indication. If you give the `-v` option, backupdb will keep you informed about its progress. In most cases we recommend that you use the `-v` option as it will give you a rough idea of how fast the backup is proceeding and how long it might take to finish.

```
-l             List what would be backed up
```

When you give this option, `backupdb` does **not** actually perform the backup. It simply lists the objects that would have been backed up as well as the source locations for those objects such as the professional services scripts.

```
-p (lowercase) Backup only the professional services scripts
```

When you give this option, the backup will **only** have the Professional Services files. It will not include the actual Time data or anything else from the database. This option is useful if you wish to move your professional services scripts to another system without moving the actual Time data. Please note that this only backups up Professional Service files in the “cgi” directory. To ensure a complete backup of all Professional Services deliverables please do a filesystem backup of the entire Journyx install directory, such as `C:\Program Files\Journyx`.

```
-O             Allow backupdb to overwrite existing files
```

Journyx `backupdb` will not overwrite an existing backup file unless you give this flag (capital O.) For safety it is never wise to overwrite your only good backup while in the process of making a new backup, so we do not recommend the use of this option.

```
-x             Ignore database busy flag
```

Normally the `backupdb` command will not perform a backup if the "database busy" setting is active on your Journyx site. "Database busy" is turned on by certain maintenance utilities such as other instances of `backupdb` or `restoredb` or the `guilockout` command line tool. When you specify `-x` it will ignore this setting and perform the backup anyway. This option does **not** turn off the prompt about the database busy flag that comes up if the backupdb program encounters an error. There is currently no way to disable that prompt.

```
-b             Use binary file format
```

Normally the backupdb command creates a human-readable “plain text format” backup file inside the compressed zip file. The `-b` (binary) option uses a more efficient format that is not human-readable. This can make the restoredb operation run up to 20% faster but otherwise has no effect.

Database Archive (Date Range based backup)

Journyx version 5.5.2 introduced the capability of archiving only a specific range of dates with the backupdb program. This creates a regular **`.jx`** backup file except that the time, expense and mileage sheets in the file will be constrained to the given date range. There are a number of reasons you might want to do this.

The most important reason to use the archive feature is to get rid of old data from prior years to improve system performance. If you no longer need to report on this data getting rid of it with Archive is a good way to trim the overall size of your database and greatly improve performance. You can still report on the data by putting it on an “archive” server away from your main production Journyx server.

Another reason to perform an Archive is in order to send a recent copy of your database to Journyx Support for troubleshooting without including all your old data from prior years. If you plan to do this, please see the note below about the `-N` option to disable the inclusion of the entire database in the archive file.

Basic Archive Usage

To make a date range archive of your Journyx data, just run the backupdb command with the **`-A`** (capital A for Archive) option. The program will prompt you for the range of dates and whether or not to delete the archived records. In most cases, to create a date range archive you do not need to provide any additional options other than the `-A`. The additional options listed below are for certain specialized options, or to avoid being prompted for the archive dates.

The program will create a regular **`.jx`** Journyx backup file. The backup file will contain all the time, expense and mileage sheets that fall within the given date range. No other data will be constrained by the date range; your archive file will always have a complete version of the Project tree and the Field Values (such as Pay Types and Bill Types.)

The archive program will prompt you near the end whether you want to delete the archived data from your live site. If you say **yes** to this question the archived sheets that fall within the date range will be *permanently deleted* from your live production Journyx site. The only copy of that data will be in the newly created archive file.

To review or report on this archived data you will need to restore the archive to a non-production “test” or “archived” Journyx site. This requires a completely separate Journyx install. If your Journyx server is running under Microsoft Windows you will need a separate machine for your “test” install as multiple Journyx installs cannot coexist on the same Windows machine. If running under Linux or Unix you can create a separate Journyx install on the same machine as long as you do it as a different system user. If you are using an external database you must also use a separate database user account.

To access the archived data simply restore the archive file to your “test” archive reporting site with the **restoredb** command. You may then log into the test site and run reports.

Please note that in most cases your separate “test” or archive reporting server will need its own license key. Please contact the Journyx Sales department if you need a separate key for archive reporting; often these keys can be obtained at a significant discount.

Archive Limitations and Considerations

The archive tool has some limitations and other issues that are important to consider when making decisions about archiving old data.

It is not possible to move data from an archive reporting site back onto your main production site. Make sure you do not enter any *new* time data on your archive reporting site. You may wish to configure the login screen of the test / reporting site to have a message warning users that it is an archive site and not to enter any new data. However you can merge new archives into your archive/reporting site using the `restoredb --merge` option described below. In general, data can only flow one way – from your main production server to the archive server.

The primary cause of large database sizes and slow archive operations is using an excessive number of "historical custom fields." (Also called historical Extra Fields in version 6.0 and earlier.) Every custom field that has the "historical for time records" option set generates a large amount of extra data that must be dealt with by the backup, restore and archive code. These options also affect the overall site performance during peak usage hours. Disable the "historical" feature on any extra fields unless absolutely necessary. As of version 5.6 Journyx built-in reports can report on the "current" value of extra fields as opposed to the "historical" value.

The archive operation itself can be slow in some circumstances. If you have a large volume of data to purge (delete) after archiving, this can take a very long time in your database server. Experiments have suggested that to delete 1,000,000 records takes approximately 1 hour of database time. A site which has 1,000,000 time records to archive plus 15 "historical extra fields" associated to time records may take up to 16-20 hours just to delete the records. That is in addition to approximately 1 hour of time to perform the archive / scanning process. Please be patient and do not cancel the archive process prematurely. If you are concerned whether the process has "hung up" check your database server for activity. RDBMS's such as Oracle have management tools which will show you progress in very long running requests such as a massive delete transaction.

See also the notes below about the `-Z` option and transaction / rollback space in your database.

Understanding Archive Date Ranges

It is important to understand how **backupdb** selects which Time, Expense, and Mileage sheets will be included in the archive. For example if you create an archive of all Pre-2002 records do not be surprised if some records from early January 2002 are included in the archive. That is because a user's 1-week time sheet may run from Sunday, December 29th 2002 to Saturday, January 4th 2003. If you have selected 20021231 (December 31st 2002) as your archive cutoff date some "overlap" sheets may contain January 2003 days.

Normally these overlap sheets will be included in the archive but they will **not** be deleted even if you choose to purge out the archived sheets. In other words, by default Time/Expense/Mileage sheets will only be purged if **all** of the dates of the sheet fall within the selected archive range. The `-Y` option overrides that feature and makes it purge all archived sheets including overlapping ones.

This lets you create archives based on any time period that you choose without worrying about splitting up Time / Expense / Mileage sheets that have already been approved by your staff.

By default overlap sheets will be included in your archive. You can use the `-X` (capital X) option to e**X**clude overlap sheets. This means that a sheet will not be included in the archive unless **all** of the dates in the sheet fall within the given archive range.

Archive Preparation Checklist

When you are considering doing an archive or purge operation please run through the following checklist to make sure that you are fully prepared.

- Have you determined the exact date range that you wish to archive? You can choose either a specific date range (such as January 2008 to December 2008) or you can choose an open ended range such as "all sheets before January 2009."
- Have you determined what you will do with the archived data? Will you simply keep the file for backup purposes or do you plan to set up the data on a separate legacy reporting site?

- Do you need to purge (delete) the archived sheets from your live production site? Using the purge option to delete archived sheets will greatly extend the total amount of time to complete the archive on very large sites. The speed of the purge operation depends entirely on the speed of your database system in deleting a large amount of data under a transaction. Usually this in turn depends on the speed of your disk(s) and the amount of data involved. It is highly recommended for the best performance that your RDBMS uses separate physical disks or arrays for data, indexes and transaction rollback space. This applies to general Journyx performance as well as the Archive operation.
- Do you have the latest maintenance release for your version of the application? Maintenance releases often contain performance improvements or other fixes for backup/restore.
- Do you have enough disk space available on the application server? You will need *more* disk space for the backup operation than the final backup file will require by itself. A good rule of thumb is to estimate 175% of the database size will be needed as temporary disk space. That means if you are backing up a 2 gigabyte database then you should have at least 3.5 gigabytes of free disk space on the application server – or more just to be safe. The space must be available on the volume that holds the backup file.
- Do you have enough time available? Archiving and purging several years worth of data from a large site with thousands of active users can potentially take up to 48 hours or more in extreme cases. For these large sites consider starting the archive on a Friday morning and letting it run over the weekend.
- Can you do a test run on a separate test site using a copy of the database? Doing this will give you a better idea of how long it will take in production. The time will be proportional to the overall size of your database and the size of the date range being archived and purged. Doing a test run will also help you be aware of any problems before they affect your production site such as running out of database transaction space.
- If you have done a test run have you restored the archive to a separate test site and verified that the correct data is archived and reportable?
- Have you notified your users that the Journyx application will be offline for a certain period of time? You should allow them a final chance to get into the system before taking it offline.
- Are you using the interactive mode (**-A**) or are you setting the archive start and end dates manually with the **–S** and **–E** options? If the latter then you must use the **–P** option to purge (delete) records. You will only be prompted to delete records if you use the **–A** interactive Archive mode.
- Have you considered using the **–S**, **-E** and **–P** options instead of **–A** interactive Archive mode? Using these options let you avoid the prompt about purging (deleting) records. This prompt only comes up after the main part of the archive operation has finished; this may happen late at night when no one is around to answer the prompt. If you want to delete archived records you should use the **–P** option to avoid the prompt. This will reduce your total amount of downtime by eliminating time wasted waiting on the prompt.
- Have you checked with your database administrator (DBA)? Have you informed him or her that the purge operation will require heavy database resources and may tie up the database for a period of hours or days in some cases?
- Does your RDBMS system (such as Oracle) have a large amount of free transaction space? (Also known as RBS, rollback segments, or just rollback.) The space you will need is related to the size of the purged records compared to the total size of the database. For instance, if your Journyx site has 5 years of data and you are archiving 2 years, you will need at least two-fifths (40%) of the data-tablespace size available as rollback space.
- Have you made an RDBMS native backup “just in case”? For instance, have you used the Oracle EXP utility to make a copy of the database?
- Have you double-checked your archive plans with members of your organization who are involved with Journyx administration, configuration and support?
- Have you studied this document in detail? Have you read about all the different command line options?

Archive Options

This section details all of the **backupdb** command options related to the Archive feature. Note that all of the Archive related options for **backupdb** are capital letters. These options are only available in Journyx version 5.5.2 and higher.

```
   -A             prompt for specific dates to Archive
```

This is the main option to invoke Archive mode. If you give this option you do not need to give the options below. With the `-A` option the backupdb utility will prompt you for the start and end dates of the archive. It will also prompt you at the end whether or not you want to purge (delete) the archived sheets from your live Journyx site. However if you use the **–S** and **–E** options (see below) to set the date range of the archive, "Archive mode" is implied and you do not need to use the **–A** option itself. Please note that in that case you will not be prompted to delete records and must use the **–P** option to force deleting of archived records.

When prompted for the archive start and end date you must enter the date in `YYYYMMDD` form (4 digit year first, then 2 digit month then 2 digit day. Use a 0 if necessary, such as 01 for January.) Use the `-` character (dash) to indicate "no limit." The program will prompt you for a new date if the date you gave is not a valid `YYYYMMDD` date.

If you give - (no limit) for both the start and end dates of the archive, then a regular backup is performed.

```
   -S YYYYMMDD    specify a start date for Archive (or - for no limit.)
```

Specify a start date for the archive in `YYYYMMDD` format. You may also use the `-` (dash) character to mean "no limit." If you specify `-S` but do not specify `-E`, the program will assume you mean the end of the archive should not be limited.

For instance, this command:

```
$ backupdb -S 20090101 myarchive.jx
```

will produce an archive starting on January 1st, 2009 and containing all records up to the current date, since `-E` is not specified.

Please note that if you use either the **–S** or **–E** option then Archive mode is assumed and you do not need to give the **–A** option. More importantly if you use either **–S** or **–E** then you should be aware that you will **not** be prompted to delete any records. If you use **–S** or **–E** then you **must** use **–P** if you want the archived records to be purged (deleted) from the site.

```
   -E YYYYMMDD    specify an end date for Archive. (or - for no limit.)
```

This specifies the end date of the archive, or `-` (dash) for no limit. Similar to `-S`, if you specify `-E` but do not specify `-S`, then the program assumes the archive has no limit for the start. For instance, this command:

```
$ backupdb -E 20090101 myarchive.jx
```

will produce an archive including all sheets from the past up to January 1st, 2009.

```
   -P (capital)   purge (delete!) archived Sheets from the live site without
prompting. (Use caution with this option!)
```

Use this option to force the Purge (deletion) of all archived sheets without prompting. Normally you will be prompted whether or not to purge the archived sheets. This option skips the prompt and always purges.

```
-Y              Purge archived sheets with some days outside the archive range
```

As noted above, by default, a sheet is only purged if **all** of the dates in the sheet fall within the archive range. This option forces it to purge even these overlap sheets, assuming that purge is enabled. This option has no effect when combined with `-X` (see below.)

```
-X (capital)   eXclude sheets whose dates do not fall entirely within the given
date range. The default is to include all sheets that have at least 1 day within
the archive date range.
```

This option excludes 'overlap' sheets -- those sheets where at least one of the days falls outside of the specified archive date range. When `-X` is enabled, these overlap sheets are **not** included in the archive, and they are **not** purged.

The default is "inclusive mode" -- a sheet is included in the archive if **any** of its dates are within the archive range, even if some of the dates are outside the range.

```
-N              Do not include 'full' backup in Archive (saves space.)
```

Normally backupdb (even in Archive mode) produces a file that contains a **full** copy of your entire Journyx database. If you have used the Archive option and try to restore an archive **`.jx`** file, the **restoredb** program will ask you whether you want to restore just the archive date range or the full database. This is done for your convenience and the safety of your data.

However, sometimes you may wish to produce an archive that does **not** contain the entire database, and you can use the `-N` option to do this. One reason to do that is to make the resulting **`.jx`** backup file much smaller, since it only needs to contain the data for the date range you specified. This is often useful when creating an archive to send to Journyx Support for troubleshooting. Often, Support will only need the last 2 months of data in order to diagnose a problem.

It is also possible to open the **`.jx`** backup file with a Zip utility such as Winzip to remove the 'full' data from an archive backup. Simply delete the `database.backup.trimmed` file within the **`.jx`** zip archive. ***Do not touch*** the `database.backup` file as this contains your primary archived time data. It is best to make an extra backup copy of the **`.jx`** backup file before you attempt to modify it.

Please note that when you give the `–N` option the `database.backup.trimmed` file inside the **`.jx`** archive is still created but it will be very small in size and will not contain your time data.

```
-Z              Do not use a database transaction when purging records.
```

Normally you will not need this option. This option is provided in case your RDBMS does not allow very large transactions. Do not use this option unless you have been told to do so by Journyx Support.

Purging archived records normally happens within a single database transaction. This is in case there is any kind of error during the delete process; in case of error, the database will be quickly restored to the state it was in just prior to the backup. In other words, either all of the archived records are safely purged or none of them are.

When you are purging a year's worth of Time and Expense data from your system it often requires a very large transaction. Occasionally a RDBMS such as Oracle can run out of transaction log space. That means you are not allowed to purge your archived records in a single transaction. Even without transaction space problems, a

very large delete of millions of records can take 12 to 24 hours in some extreme cases so please be patient. (See notes above about large deletes.)

The best way to handle a transaction space situation is to have your DBA (database administrator) increase the transaction log space in the Journyx database and then re-run the backup/archive.

This temporary disk space for transaction information is called "rollback segments" or RBS in Oracle. In Microsoft SQL Server, it is just called the transaction log file. Normally, SQL Server adjusts the space for this file automatically. Depending on its configuration, Oracle does **not** adjust RBS space automatically and your DBA must make manual adjustments. The most common Oracle error indicating too little RBS space is `ORA-01555` "snapshot too old" error.

On Oracle you must have at least one free RBS that is large enough by itself to contain the entire transaction. It will not work to have lots of different small rollback segments. The size required obviously depends on your particular data. The best way to tell is to look at the (uncompressed) size of the `database.backup` file within the **`.jx`** archive that you just created. In general, you must have a free RBS with at least 80% of the size of your uncompressed `database.backup` file to do a purge.

If it is not possible to increase your transaction log space you can specify the `-Z` option to do the purge in multiple transactions. This avoids the problem of needing one single large transaction logfile. The downside and danger to this option is that if something goes wrong during the purge, some of the archived records may have been deleted while others were not. This may leave your database in an inconsistent state and lead to unpredictable and unsupported errors.

In the unlikely event that this happens it is recommended that you do a full restore of Journyx from your most recent backup. In most cases you can use the archive file that was just created prior to the purge error.

Restoring Journyx Databases

The **restoredb** program allows you to restore the backup files that you created with the **backupdb** command. If you are on Unix, be sure to source the Journyx **`pi/bin/setup`** file before running restoredb as described above in the section for **backupdb**.

In general, you do not need to provide any options to **restoredb** other than the name of the **`.jx`** backup file. The program will prompt you for any information that it needs. However, a number of options are provided to tweak the restore behavior and in some cases avoid the prompts. Keep in mind that restoredb will delete any data currently on the site and replace it with the data in the .jx backup file. However the `--merge` option described below changes this, allowing you to restore to a site without erasing the existing data. This should only be used in conjunction with the “Archive” features of backupdb.

restoredb options

```
   -P            Do not restore professional services scripts
```

This option should be self-explanatory.

```
   -A            Clean restore of special Database Archive format (this will
overwrite any current data)
```

This option skips the prompt when you attempt to restore an Archive (date range limited) backup. The prompt asks you whether you want to restore the specific date range or the entire backup if available. If you specify this `-A` option, it will skip the prompt and just restore the archived (date-range) data set. This option is only available on Journyx 5.5.2 and higher.

```
   -p            Restore professional services scripts without restoring database
```

Just restore a set of Professional Services scripts without touching the actual database.

```
-F              Do not force foreign key constraints after migration
```

Do not use this option unless instructed to do so by Journyx Support.

If Journyx is unable to activate a foreign key (FK) constraint due to corrupted records it will automatically delete and log the corrupted records. This option overrides that behavior; unless the FK is mandatory it will be disabled in case of any corrupted records.

```
-u                      Create an undo file
```

This option creates a backup file of the current Journyx database before restoring the file named on the command line. You will be prompted for the name of the 'undo file'. The undo file is just a regular Journyx **`.jx`** backup.

```
-k [license]            Specify license key
```

Allows you to specify a new license key for the site on the command line without being prompted.

If you do not specify this option, you will be prompted for a new license key. At that time you may simply press Enter if you wish to keep the existing license key that is currently on your site. The existing key will not be displayed.

```
-x                      Ignore database busy flag
```

Restore the database even though the 'database busy' (system maintenance) flag is already set. Be careful when using this flag as some other administrator on a different account may actually be doing maintenance work at the same time.

```
-q                      No output or warnings
```

If this option is set **restoredb** will not print any status output to the console.

```
-d                      Turn debugging on
```

Normally, "extended tracebacks" are turned off automatically after a restore. This option turns on extended tracebacks (also called 'debugging' in the Logging Preferences screen) after a restore.

```
-l                      Turn debug logging on
```

Usually "diagnostic logging" (`journyx.app.log`) is turned off automatically after a restore. This option turns on diagnostic logging for the restore itself, and leaves the option on after the restore.

You should not leave diagnostic logging on for extended periods on your production server unless instructed to do so by Journyx Support. The log file (`journyx.app.log` in your Journyx `tmp` directory) can quickly fill up all available disk space on a busy site. Leaving Diagnostic Logging turned on will also slow down overall site performance.

```
 --merge          Merge the data in the backup file into the current site.
```

This option is currently not shown on the restoredb help/usage screen. It merges the data in the backup file into the current site without erasing the existing data. This can be used in conjunction with the “Archive” feature of backupdb to merge newly archived data into an existing archive/reporting site.

```
-? or --help             Show this usage screen
```

Shows a short help screen listing the restoredb options.

Other Backup / Restore Topics

Automating Backups

These instructions only apply to Microsoft Windows Server. It is also possible to schedule automated backups on various Unix systems using the "crontab" command. Please consult your Unix System Administrator or documentation for details.

To set up a scheduled task in Windows Server, right-click “My Computer” and select Manage then choose Scheduled Tasks.

Double-click "Add Scheduled Task." Click Next.

It will ask you to select the program to run. The Journyx backupdb will usually not be on the default list. Therefore, click Browse. Select the backupdb.bat file. Assuming you installed Journyx to the default location, that will be:

```
C:\Program Files\Journyx\jwt\bin\backupdb.bat
```

Next it will ask you to select a name for the task. Name it something like "Journyx Nightly Backup."

Normally you will want to run the task every night, so select Daily and then click Next.

It will then ask you more questions about when to run the task. Choose a time for the task. We strongly recommend that you test the backup task at least once during normal business hours, and then after you confirm that it works set it to run at an off-peak time such as 4 a.m. After you have selected a run time click Next. After you have created the scheduled task, you can test it at any time by right-clicking on it and selecting 'Run.'

It then will ask you which Windows user should run the task. It is critical that you choose the same user account that you used to install the Journyx software. If you use a different account here, it will not work. Be sure to give the appropriate account password for that account and then click Next.

Now you must be sure to set some options on the `backupdb.bat` command line, so be sure to check "Open advanced properties" on the final screen of the wizard.

In the Properties screen, change the Run: line as follows:

(Original)
```
"C:\Program Files\Journyx\jwt\bin\backupdb.bat"
```

(New)
```
"C:\Program Files\Journyx\jwt\bin\backupdb.bat" -Ox ..\..\NightlyBackup.jx
```

Note: you cannot use a path with spaces when editing the command line for a Scheduled Task; therefore we use the ..\..\ relative path as above. An example of a path with spaces is "C:\Program Files\Journyx"

It is important to note that the scheduled task as described above will cause it to overwrite the previous night's backup every time. This is not a good idea. If something goes wrong with the backup, you have just deleted your previous (good) backup. We recommend that you create a separate batch file which saves the old backup file before running backupdb.

For instance, you can create a new file in the `%WTHOME%\jwt\bin` directory called `autobackup.bat`. Be sure to create the file with a plain text editor.

Put commands like this in the `autobackup.bat` file:

```
c:
cd "c:\Program Files\Journyx"
copy NightlyBackup.jx PreviousNightlyBackup.jx
cd jwt\bin
backupdb.bat -Ox "C:\Program Files\Journyx\NightlyBackup.jx"
```

Then you can change the Windows Scheduled Task to run the `autobackup.bat` file instead of `backupdb.bat`. Be sure to test the Scheduled Task by right-clicking on it and selecting "Run."

Native Backup Formats

In this section we describe briefly how to perform "native" database backups for the PostgreSQL "Internal Database" included in Journyx. Please see the "Backup Techniques" chart above to determine whether making native backups is the right strategy for your organization.

Journyx also supports external Oracle and Microsoft SQL Server databases, but the recovery tools for those systems are not described in detail here. Please consult with your DBA (database administrator) if you are using Oracle or Microsoft SQL Server and wish to create native backups.

Oracle

Native backups are normally launched through the “Enterprise Manager” program. Please consult with your Oracle DBA (database administrator) for details. Some online documentation for Oracle backup and recovery is available here:

http://www.orafaq.com/wiki/Oracle_database_Backup_and_Recovery_FAQ

Microsoft SQL Server 2008 and later

Microsoft provides a program called SQL Server Management Studio to manage a SQL Server database. This tool lets you perform native backup and recovery operations from directly within the tool. Please consult your SQL Server DBA (database administrator) or Microsoft documentation for detailed instructions. Here is a link to documentation for SQL Server 2008:

http://technet.microsoft.com/en-us/library/ms187048.aspx

PostgreSQL Native Backups

It is quite simple to make a "native" backup with PostgreSQL (PG), whether it is the version provided by Journyx or your own external PG site.

The **pg_dump** command creates the backup. Normally the data is dumped to the console (screen) so you will want to redirect it to a backup file. In this example, assume that your database is named `journyx` and you wish to backup to a file named `my_dump.sql`. (Please note that when the Internal Journyx PostgreSQL instance is used, the database is named "journyx", so you would use `journyx` in your command.) The **psql** command restores the backup file.

PostgreSQL on Linux

This command creates the backup from the ‘journyx' database:

```
$ pg_dump -c journyx > my_dump.sql
```

The `-c` makes a 'clean' backup including commands to drop old data.

This command restores the backup to the ‘journyx' database:

```
$ psql journyx < my_dump.sql
```

After that completes, simply restart your Journyx site (`wstop`; `wstart`) to access the newly restored data.

PostgreSQL on Windows

Running a native PostgreSQL backup on Windows is very similar to Linux but some additional options may need to be supplied, namely the `-P` (port) option since the copy included with Journyx doesn’t run on the default port.

First open a Journyx Command Line Prompt, under Start → Journyx. Now change to the `%WTHOME%\pgsql\bin` directory:

```
> cd “%WTHOME%\pgsql\bin”
```

Now run a command like this:

```
> pg_dump -h 127.0.0.1 -U journyx -p 5532 -c journyx > my_dump.sql
```

-h sets the host name. –U specifies the username and –p specifies the port (use 5532.) The `-c` makes a 'clean' backup including commands to drop old data. ‘journyx’ is the default database name.

This command (run from the `%WTHOME%\pgsql\bin` directory) restores the backup to the ‘journyx’ database:

```
> pgsql -h 127.0.0.1 -U journyx -p 5532 journyx < my_dump.sql
```

After that completes, simply restart your Journyx site (as described in the Windows Service Control section above) to access the newly restored data.

External Database Setup Instructions

Journyx v11 and External Databases – General Instructions

This document describes how to make Journyx Timesheet 11.x work with an external database such as Microsoft SQL Server, Oracle, or PostgreSQL.

All Timesheet customers who wish to use an external database should read this page carefully as the requirements and supported databases have changed in Timesheet 8. An "external database" is any database system that is not supplied by Journyx. Only three external database platforms are supported by Timesheet:

Microsoft SQL Server 2008 or later(http://www.microsoft.com/sql) Supported on Windows servers only.

Oracle Database version 10g or later(http://www.oracle.com/) Supported on Windows and Linux servers.

PostgreSQL version 9.4 or later(http://www.postgresql.org/) Supported on Windows and Linux servers.

Please make sure you have reviewed and complied with the hardware requirements, supported operating systems, and supported database platforms before proceeding. These requirements have changed as of Timesheet 8.0. http://community.journyx.com/Files/timesheet_hardware_recommendations.pdf

All customers who are setting up external database installations should at least read the General Notes section and the section pertaining to your specific database system. All of the instructions and guidelines on this page apply equally to Windows and Unix servers unless otherwise noted.

You must follow all of the steps in this section for a successful external database install of Journyx Timesheet. Any optional steps are clearly noted. Please read this page thoroughly before beginning your Timesheet setup process.

High Level Overview

These are the general steps to follow to install Timesheet to an external database.

If your external database is not already up and running, you must install it according to the vendor's instructions. Make sure you have installed all available security patches and hotfixes.

Set up a database (also called tablespace) for the Timesheet data. Make sure to choose the appropriate character set and collation as described under the section for each particular type of database. The collation affects the linguistic sort order of items in various screens.

Set up a database user account for just for Timesheet. Each Timesheet installation needs its own separate database user account.

Install your database vendor's client access software on the Timesheet server. Journyx does not provide either Windows or Unix/POSIX database drivers.

(Windows only) Set up a Windows System DSN that connects to the appropriate database (tablespace) as the appropriate database user. Test the connection from the ODBC control panel with the Timesheet account name and password before proceeding.

(Unix only) If you are using Oracle, you must obtain and install the Oracle Instant Client software for your operating system. Read and follow the included instructions. This package is available directly from Oracle here: http://www.oracle.com/technology/tech/oci/instantclient/index.html. Only the "Basic" package is required for Timesheet. The "Basic Lite" package can be used but has limited support for non-Western languages. You may wish to install the SQL*Plus package for your own testing purposes but it is not required or used by Timesheet.

Install the Timesheet application according to the instructions. When prompted during the Windows installation, type in the name of the System DSN and the database user's ID and password. On Unix you give the connection information to your database. For full details see the platform-specific instructions below.

The Timesheet installation process will automatically create all the necessary tables, indexes, and other schema objects. On Windows it will then forward your browser to the site login screen. On Unix the URL of the site will be printed in the terminal.

General Notes for ALL Databases

Each supported DBMS (Database Management System) has its own set of specific instructions. In addition to that there are general instructions that apply to all database systems. Please review these general considerations, then check below for special instructions for your specific database system. After that you can follow the rest of the instructions in the "Timesheet Setup for All Databases" section.

Character sets, collations, national languages, 'special' characters, etc.

Timesheet 8.0 and higher uses Unicode character storage which can represent virtually any human language. However only a single "collation" or linguistic sort ordering can be used on a Timesheet site. The collation affects the ordering of results, among other things. Generally you can only pick the collation when you initially set up the database. Once the character set and collation are chosen they cannot be easily changed later, so please read and follow these guidelines carefully. Note that on Microsoft SQL Server you must choose a collation that is marked "CS" or "Case Sensitive." Please refer to the Journyx Database/Unicode Support for more details on choosing a database encoding. See also the Wikipedia article on Unicode.(http://en.wikipedia.org/wiki/Unicode)

PostgreSQL

Always select "Unicode" / "UTF8" for the character set when creating a new database for Timesheet. The collation is determined by your operating system environment - the "Locale" on Unix and "Region and Language" settings on Windows. The collation is set when database is created (initdb) and cannot be changed later. Before you install on Unix you can run the command "locale" to print out the currently selected locale. For instance, en_US.utf-8 indicates English (en) as used in the United States (US). And de_CH.utf-8 indicates German (de) as used in Switzerland (CH). The command *psql -l* will print the encoding and collation of all databases in the system.

Oracle

Timesheet will automatically use the Unicode character set on Oracle regardless of which character set is selected. However it will default to using UTF-16 which is less efficiently processed for most Western European languages. It is recommend you install to a UTF-8 "national character set" for optimum efficiency. See the Unicode support page and the external Oracle instructions for more details. The National Language setting

(NLS_LANG) affects the collation (sort order). National Language and related settings are a complex topic in Oracle. Please speak with your Oracle DBA regarding the optimal settings for your users.

Microsoft SQL Server

Be sure to pick a "Case Sensitive" collation such as SQL_Latin1_General_Cp1_CS_AS. Microsoft denotes case sensitive with the letters CS in the collation name. Timesheet will automatically use the Unicode character set on Microsoft SQL Server but the collation affects the sort ordering of search results. See the MS SQL Server Detailed Instructions.

Database user accounts

You must always create a separate Database user (login) and database (tablespace) for Journyx Timesheet in your Database Management System (DBMS). Do not let Journyx Timesheet use the "sa", "sys", or "system" accounts, and do not give the Journyx Timesheet user access to any other database objects outside of its own tablespace / schema. Failing to follow Best Practices in this regard could put the security or availability of your DBMS in jeopardy.

In some versions of Microsoft SQL Server, by default the administrator account (which has complete control over all data) is "sa" and the password is "" (a blank password.) If you have not already changed the SA password, Journyx strongly recommends you do so as a first step before completing the rest of these instructions. Contact your organization's Database Administrator or SQL Server documentation for details on how to change account passwords.

Similarly, Oracle has a set of default administration passwords that should be changed. The administrative passwords should be changed immediately after installation and a separate database user account for Journyx Timesheet should be created.

The Database Must Be Blank!

You can only use a blank database with Timesheet: one that does not already have any tables. The Timesheet Database Integration program will not let you proceed if there are already tables in the database. This is in order to prevent you from installing over an existing Timesheet site and deleting all of your existing Time and Expense data.

Normally we recommend that you simply create a new user and tablespace for your new install and leave your old external database in place in case you need it. To reuse a database that already has tables, you must first 'wipe' the database by dropping all tables. Your Database Administrator or Journyx Support can help you with this.

Once you have a working database connection, you may install Timesheet. If you have already installed it, run the "Setup Web Server and Database" program again. This program will configure your web site and database connection. If it detects that there are already tables in that connection, the program will print a message about this and exit. (See above.) Otherwise, it will prompt you to either create a new Journyx site or "Cancel" (do nothing.) Usually you will want to click the "Create a new site" option. You can always run the restoredb utility from the command line at any time. If you hit "Cancel" here, no modifications will be made to the database, but Journyx Timesheet itself will not be working.

Journyx Database/Unicode Support

Journyx Timesheet version 8.0 and higher fully supports native Unicode storage in the database. This means user-entered text from different languages can be freely mixed on the same site. However only one "collation" (linguistic sort ordering in things like search results) can be used on a site. See below for collation details. Earlier version of Timesheet such as version 7.9 have limited or no Unicode support. Timesheet 8.0 and higher automatically uses Unicode on Microsoft SQL Server, and the internally provided PostgreSQL database option. However when setting up an external PostgreSQL database connection, you will need to create the database with the "UTF8" (Unicode) character set as described in the external PostgreSQL setup instructions. In addition, you should be aware of the difference between the UTF8 and UTF16 encodings of

Unicode. They are both "Unicode" and can store the exact same list of characters. However, they are stored in different binary formats which mainly affects the amount of disk space and memory required. UTF8 is more efficient for databases which are primarily Western European languages. UTF16 is more efficient for Asian languages and some others. Using UTF16 to store English or other Western texts can double the size of the database compared to Timesheet 7. Microsoft SQL Server only stores Unicode in UTF16 format. PostgreSQL only stores Unicode in UTF8 format. Oracle offers a choice between the two, but the default is UTF16. You can only change it to UTF8 when initially creating the database and not after creation. Therefore, if you are planning to use Oracle with Timesheet 8 and your users primarily use Western European languages such as English, Spanish, French, Italian or German, then you should choose UTF8 for your Oracle "national character set" setting when initially creating the database. See the external Oracle instructions for details. As mentioned above, only a single collation can be used on any given site. The collation determines the linguistic sort ordering of search results and similar things. The collation is determined during the external database setup. Please refer to the appropriate external database instructions for your platform for details. The collation for the internal database (the provided copy of PostgreSQL) is determined automatically based on your operating system language settings. Once it is set it cannot be changed without recreating the database environment. In most cases a single collation combined with the Unicode universal character set will provide satisfactory results for most users.

Database Installation Details

Microsoft SQL Server on Windows Servers

This document provides instructions for connecting Timesheet version 8 and higher to an external Microsoft SQL Server 2005 (or higher) instance.

1. Make sure you hav*e read the* General Instructions section before proceeding.
2. Install Microsoft SQL Server 2008 (or higher) if not already installed. SQL Server 2000 or 2005 is not supported for Journyx v11. If installing for the first time, you may wish to change the default collation (sorting order) to "case sensitive" (SQL_Latin1_General_Cp1_CS_AS). If you have already installed SQL Server, you may change the collation for individual databases when you create them. (See below.)
3. Create the Journyx Timesheet Database
   - 3.1. Open the Microsoft SQL Server Enterprise Manager program.
   - 3.2. Connect to the database. If the database is installed on the local machine but doesn't show up in the list of databases, try the name "(local)" (including parenthesis.)
   - 3.3. Find the server in the left-hand pane ("Object Explorer") to display sub-tree for this DB server. Find the database instance you wish to use and expand its icon.
   - 3.4. Select "Databases" and right-click on it.
   - 3.5. Select "New Database".
   - 3.6. Choose a name for the Journyx Timesheet database such as journyx.
   - 3.7. Important: If your users are in the Americas or Western Europe, select SQL_Latin1_General_Cp1_CS_AS for the "Collation name" option. You must choose the correct Collation name or the Journyx Timesheet database setup script will fail with a message like: "Your current database does not seem to support case-sensitive sorting order." If your users require a different character set other than Latin-1, make sure to pick the case-sensitive version of your desired character set. The Accent-sensitive (AS) variety is optional but you may choose if it your users wish for accents to be distinguished in sort orderings.
   - 3.8. In the second tab (Data Files), make the initial size of the main database file at least 50MB. The exact initial size is not important as long as the database is set to "autogrow." Initial size can be estimated by multiplying 1.2MB by the number of users who will be keeping Time that you will have over the course

of the year and adding 10MB to that number. This does not take into account the size of expense or mileage records, so if your paradigm is to have 1:1 time to expense or mileage records, for example, you will want to double the size.

3.9. If you wish, you may wish to change the options on the third tab ("Transaction Log"). Typically an administrator will place the transaction log file on a different disk and controller than the actual database, to improve performance. This is completely optional.

3.10. Default values are preferred for the rest of the options on this screen.

3.11. Click OK to create the database.

4. Create Database User

4.1. Please Note: Journyx strongly recommends that you do not use the default "sa" account that is built in to SQL Server.

4.2. Expand server icon to display sub-tree for this DB server.

4.3. Expand the SECURITY folder

4.4. Select "Logins"

4.5. Right-click and select "NEW LOGIN".

4.6. Fill in the desired login name. Usually you will want to use journyx, or the same name as the database space you created above.

4.7. Under Authentication, be sure that GRANT ACCESS is selected

4.8. Change the method to SQL Server Authentication and fill in the desired password. NT Authentication is also supported but read the note below.

4.9. Please Note: Special characters, such as ~!@#$%^&*(){}_+-={}|[]\:";'<>?,./ are not supported within the SQL DB user account. If you use one of these characters in the password then you will see an error message that your database collation is incorrect, even if your database collation is correct. Please only use letters (uppercase or lowercase) and numbers in your password. Later, you will give this password to the Journyx Timesheet database setup program.

4.10. Authentication options: Both SQL Authentication and NT Authentication are supported. However in order to use NT Authentication you must do these things:

4.10.1. You must create an DSN (Data Source Name) for the connection in the ODBC control panel. In other words, you cannot use the "DSN-less" style connection.

4.10.2. You must add the web server user (typically "IUSR" or "NT AUTHORITY\IUSR") to the list of authorized users for the database. The IUSR must be given the "db_owner" Database Role membership.

5. The "Install User" (your Administrator-enabled Windows login account) must also have the "db_owner" role. Typically this happens by default anyway if the user is an Administrator.

5.1. Change the Default Database for the user to be journyx or whatever you named the database space that you created above.

5.2. Click the Database Access tab

5.3. Select the journyx database (or whatever you named it) by checking the box to the left of the name

5.4. Grant the user db_owner right to this database

5.5. Click OK to add this user. You will be prompted to confirm the password.

6. At this point the database is setup and ready to be used by Journyx Timesheet. You can exit the enterprise manager program.

7. Create the ODBC System DSN for Timesheet. Open Control Panel and search for "ODBC" or find the "Setup Data Sources (ODBC)" option under Administrative Tools.
8. Click on "System DSN" and click "Add..."
9. Select the "SQL Server Native Client 12.0" option if available, or just "SQL Native Client" if you only see that, or MS ODBC 13 or higher, then click Finish. If you don't see either of those options, and the SQL Server is on a different host, you may need to download and install Microsoft's SQL Server Native Client directly from Microsoft. Most recent editions of Windows include the Native Client driver though.
10. Give the DSN a name such as "Journyx".
11. For Server put "(local)" (with parenthesis, without quotes) if it's the local server, otherwise put the SQL Server hostname, then click Next.
12. You can use the "Integrated Windows Authentication" option if so desired, but read the notes on that above. Otherwise select "SQL Server Authentication" and put in the name and password you created above. Keep "Connect to SQL Server for default settings" checked, then select Next.
13. Important: Check "Change the default database to:" and change the selection to the database you created earlier such as journyx. Leave the other options set to the defaults, then click Next. Leave all the options at the default on the following screen then click Finish.
14. Click "Test Data Source..." and if that works, click OK, then OK again at accept all the changes. You have now created a SQL Server system DSN.
15. Run the Timesheet installation program. Be sure and read all the information in the "Read Me First" file that it shows you during installation. Allow it to reboot your computer at the end and the "Setup Web Server and Database" program will run.
16. Choose the webserver such as IIS and other options as prompted.
17. You will be asked if you want to use the internal PostgreSQL connection or if you want an external database connection. Choose "Connect to an external database system."
18. Select the SQL Server option.
19. Select the DSN you created earlier. If using SQL Authentication, put in the account name and password here. If using NT Authentication, put your Windows NT login information here instead.
20. Fill in this info and click OK. If a connection cannot be established, for instance due to a wrong password or hostname, you will be given the opportunity to either try again with the same info (for instance, if the SQL Server service was temporarily offline) or else to create a new connection with different info. At this point it will create all the tables and views for Timesheet and will eventually send you to a login screen. It will pop up an alert message with the initial username and password.
21. If necessary, you can run a "restoredb" command from the command line to populate your Timesheet data from a .jx backup file.

PostgreSQL 9 or Higher Database Detailed Instructions

This section describes how to set up Journyx Timesheet to use an external PostgreSQL database. This covers both Windows and Linux servers.

Journyx provides an "internal" copy of the open-source PostgreSQL(http://www.postgresql.org/) database. The Internal Database does not require any special setup instructions. However, if you want Timesheet to use your own externally controlled PostgreSQL server, you should follow the instructions on this page.

Follow these steps to install to an external PostgreSQL instance.
1. Make sure your PostgreSQL server is version 9.4 or later.

2. Make sure you have read the General Instructions section before proceeding.
3. Create a database for Timesheet with the createdb -E UTF8 <database_name> command. Consult the PostgreSQL documentation(http://www.postgresql.org/docs/9.4/static/managing-databases.html) for more information on creating databases and users. For Timesheet 8.0 and higher the encoding should always be UTF8. You set the encoding with the -E UTF8 argument to createdb. The locale, which influences things like collation (sort order), will normally be determined by the environment's locale settings, but you can override the locale with the -l locale option.
4. Create a "role" (user) in PostgreSQL for the Timesheet account(http://www.postgresql.org/docs/9.4/static/database-roles.html). Make sure the role has permissions to access the database you created above.
5. Make sure the plpgsql language is installed in the database.
6. Run this command: createlang plpgsql <database_name>
7. See your PostgreSQL documentation on createlang(http://www.postgresql.org/docs/8.4/static/app-createlang.html) for further information on createlang.
8. Follow either the Windows or Linux instructions below, depending on your platform.

Windows-only PostgreSQL Instructions

1. Install the product by double-clicking on the installer and following the prompts. Even if you install the "internal" copy of PostgreSQL (which is included by default) you can still use an external PostgreSQL connection.
2. The installer will prompt you to reboot the system. Go ahead and reboot and when you log in it will run a program called "Setup Web Server and Database." This will guide you through installing to a web server and database connection.
3. After installing to the web server, it will ask you whether you want the Internal PostgreSQL connection or an external database system. Select "Connect to an external database system" then choose PostgreSQL.
4. Put in all the required information: Host, Port (default is 5432), Database Name, Username and Password, then click OK. If you made a mistake in the info such as a bad password, chose the option to "Try a new connection" then chose PostgreSQL again and correct the information.
5. When that finishes, you can run a "restoredb" command from the command line to populate your Timesheet data from a .jx backup file. Linux-only instructions:

Linux-only PostgreSQL Instructions

When the database is ready, unzip and un-tar the product distribution in the normal manner.

Run the jtinstall install script and give the --postgresql "DBURL" option. DBURL indicates how to find your PostgreSQL server and it must be formatted exactly as follows. Include the double-quotes around the entire DBURL.

./jtinstall --postgresql "username/password@//host:port/dbname"

Where:

username is the PostgreSQL username.
password is the PostgreSQL user password.
host is the hostname or IP address of the PostgreSQL server.
port is the port number of the PostgreSQL server. 5432 is the default.
dbname is the database name from the createdb command.

Oracle 10g or Higher Instructions

Oracle 10g or Oracle 11g or higher is required. Earlier versions of Oracle are not supported.

Oracle requires a certain level of database administrative knowledge, access, and expertise. If you are planning to install Timesheet to Oracle, make sure you have an Oracle DBA (Database Administrator) available to answer any questions regarding the optimal setup. If you do not have an Oracle DBA available then Journyx

recommends you use the included PostgreSQL database instead which offers competitive reliability and performance in most situations.

Oracle has a set of default administration passwords that should be changed. The default Oracle accounts/passwords in some versions of Oracle are sys/change_on_install and system/manager. Both of these passwords should be changed immediately after installation, and a separate account for Journyx Timesheet should be created as described below.

The instructions on how to create objects inside Oracle such as users and tablespaces are written based on Oracle 11g, the current version as of this writing. The instructions may have to be adjusted slightly under Oracle 10g. Earlier versions of Oracle such as 9i are no longer supported for Timesheet.

Oracle provides two client packages for connecting to an Oracle server; the "Full Client" and the "Instant Client". Timesheet works with either one, but normally you should only install one or the other, not both.

With either client the connection to the Oracle server is specified in so-called "TNS-less" format. All you need to know is the hostname, Oracle Service Name, and your account username and password.

The Oracle Instant Client is a smaller download and is the fastest way to get going. Download it from here: http://www.oracle.com/technology/tech/oci/instantclient/index.html. (Note: it may require you to register with Oracle.com.)

Only the "Basic" package is required for Timesheet. The "Basic Lite" package can be used but has limited support for non-Western languages. You may wish to install the SQL*Plus package for your own testing purposes but it is not required or used by Timesheet.

Other questions about installing and using the Instant Client may be answered here: Oracle Instant Client FAQ.

On Windows you must unzip the Instant Client files to a directory like c:\instantclient_11_2 and then add this directory to the beginning of your System Path variable and then reboot before installing Timesheet. Detailed instructions are found below.

On Unix you decompress the Instant Client files to a directory like /usr/local/instantclient_11_2 and then set the ORACLE_HOME environment variable to that location. For instance, $ export ORACLE_HOME=/usr/local/instantclient_11_2

Please note that you must not have a trailing / (slash) character at the end of ORACLE_HOME. Having a trailing slash can cause the error "Unable to acquire Oracle environment handle" and/or may cause the Journyx Timesheet installer to abort.

If you use Oracle's "Full" client (not the Instant Client) then the appropriate directories are added to the system Path for you. However, you may need to reboot after installing the Oracle Client. Be sure to read the setup instructions provided by Oracle.

If you have both Oracle Full Client and Instant Client installed, you may run into this error booting the Timesheet database: ORA-24315: illegal attribute type. If you get this error, make sure that the Instant Client directory appears in your path before the Full Client path. Look for a path entry like C:\oracle...\bin, or c:\app\\product; and place the Instant Client directory before that one. Or place the Instant Client directory (such as c:\instantclient_11_2) at the beginning of the Path line. Make sure a semicolon (;) separates the entry from the next one. Click OK. You must now reboot the computer for this to take effect. Do so and rerun the "Setup Web Server and Database" program.

Detailed Oracle Setup Instructions (first steps for all platforms)

1. Make sure you have read the ***General Instructions*** section before proceeding.
2. Install the Oracle server (version 10g or higher) if not already installed. Change the passwords for the administrator accounts sys and system if that has not been done yet.
3. Install the Oracle client software on any Timesheet application servers and verify that you can connect to your server using SQL*Plus or a similar tool. Journyx recommends you install the Instant Client as described below.

4. Do not attempt to connect to an already-populated Timesheet database, especially if the data is for an older version of Timesheet. These instructions assume you're creating a new, blank database. You can run a "restoredb" command later to populate the site from a Timesheet .jx backup file.
5. You should be aware of the difference between UTF16 (also called ALT16UTF16 by Oracle) and the UTF8 encoding. Both encodings are Unicode and can store the exact same list of characters. However, they are stored in different binary formats which mainly affects the amount of disk space and memory required. UTF8 is more efficient for databases which are primarily Western European languages. UTF16 is more efficient for Asian languages and some others, and the same efficiency as UTF-8 for primarily Cyrillic text. Using UTF16 to store English or other Western texts can double the size of the database compared to Timesheet 7.

   Journyx recommends using UTF8 in most cases. Oracle offers a choice between the two, but the default is UTF16. You can only set it to UTF8 when initially creating the database, not after creation. Therefore, if you are planning to use Oracle with Timesheet 8 and your users primarily use Western European languages such as English, Spanish, French, Italian or German, then you should choose UTF8 for your Oracle "national character set" setting when initially creating the database instance as described below. You cannot change this later. UTF16 works fine but has increased storage requirements - approximately double.
6. Open Oracle's Enterprise Manager program (aka Database Control) and log in as SYS or an equivalent role. Use the "Connect as SYSDBA" option.
7. Create the Oracle Instance, if you have not already, following Oracle's instructions for creating instances. Be sure to select UTF8 as the "national character set" if you use English or other Western European languages as described above. The default is UTF16 and this can require increased storage space. Note that the "national character set" setting is separate and distinct from the "character set". Typically to create a new instance you run the "Database Configuration Assistant." On the Initialization Parameters page, select the Character Sets tab. Notice there are two sections, "Database Character Set" and "National Character Set." Timesheet only uses the latter, so even if UTF8 is selected for "Database Character Set", it will be ignored. If you wish to use UTF8, then you must select "UTF8" under National Character Set. The "Database Character Set" setting is ignored by Timesheet.
8. Create a Data Tablespace for the Journyx Timesheet user if one doesn't already exist. Normally you will want to create a separate tablespace for Journyx Timesheet, but it is possible to use the Oracle-supplied USERS tablespace (which is the default for new users) provided there is enough free space. If you plan to use the USERS tablespace, when you create the Journyx Timesheet user, be sure to leave his default tablespace as USERS
   8.1. Click on the "Server" tab.
   8.2. Click "Tablespaces" under the Storage heading.
   8.3. Click "Create".
   8.4. Give the tablespace a name like JOURNYX_DATA.
   8.5. Leave the default options: Extent: Locally Managed. Type: Permanent. Status: Read Write.
   8.6. Under Datafiles click Add and create a new storage file.
   8.7. Make the initial size at least 100 mb. The exact size is not important as long as the datafile is allowed to grow (as is the default.) Note: if you choose not to make the tablespace auto-grow, you will be responsible for monitoring Timesheet's space usage and adjusting the tablespaces appropriately.
   8.8. Click "Create" to bring the tablespace online.
9. Create a Role for the Journyx Timesheet user.
   9.1. In Enterprise Manager, click the Server tab.
   9.2. Under "Security" click the "Roles" option then click "Create" on the next screen.
   9.3. Name the role something like TIMESHEET_USER. Leave "Authentication" set to None.
   9.4. Click on the Role tab then click "Edit List".

9.5. Assign the CONNECT role, and no others, then click OK.

9.6. Click on the "System Privileges" tab then click "Edit List".

9.7. Assign only these privileges (without the Admin/Grant option):

- CREATE SEQUENCE
- CREATE TABLE
- CREATE VIEW
- CREATE TRIGGER
- CREATE PROCEDURE

9.8. Then click OK.

9.9. Click "OK" to finish creating the Role.

10. Create a Journyx Timesheet user.

10.1. In Enterprise Manager, click the Server tab then select "Users" under the Security header.

10.2. Click "Create."

10.3. Assign a user name like journyx and assign a password. You will need to supply this username and password later.

10.4. Important: Change the default tablespace of the user to JOURNYX_DATA or whatever you called the Data Tablespace. Leave the Temporary tablespace "TEMP" unless your DBA has told you otherwise.

10.5. Click on the Roles tab. Assign the user the Role you created above (TIMESHEET_USER) and no other.

10.6. Click on the Quota tab. Give this user "unlimited" quota on the JOURNYX_DATA tablespace. If you do not give the user quota on his default tablespace, the Journyx Timesheet Database setup will fail because the user will be unable to create any objects. If you choose to set a quota, be prepared to manually monitor Timesheet's space usage and adjust the quota as needed.

10.7. Click "Create" to finish creating the user.

11. You must also grant the EXECUTE privilege on the DBMS_LOCK package to the Journyx database user (or PUBLIC).

12. There are several ways to do this. The most direct way is to run this command in SQL*Plus when logged in as sys or another appropriate system user: ***grant execute on dbms_lock to journyx*** Replace journyx with the actual name of the database user, or use PUBLIC to grant this to everyone. The DBMS_LOCK package provides resource locking management code for Timesheet. You can also perform this grant through the Oracle Enterprise Manager console. In Oracle 11g, you should click on the instance in question (e.g. ORCL) and then click on Schema. Under the Schema screen, click on "Packages" under the Programs heading. On the search screen put DBMS_LOCK in the Object Name field then click Go. You should see DBMS_LOCK in the search results. Click on the package name DBMS_LOCK. On the next screen, find the Actions pulldown on the top right then select Object Privileges then click Go. Now choose the EXECUTE privilege then find the Journyx database user (or PUBLIC) in the Available Users and Roles list. Then click OK to create the privilege. Now click Apply on the resulting screen to perform the changes.

13. Verify that you can connect as this user from your desired Timesheet application server using SQL*Plus or a similar tool.

14. Continue with the appropriate platform-specific instructions below.

Windows-only instructions:

1. If using the Oracle Full Client, read Oracle's instructions and install the client and reboot. Test that you can connect to your desired Oracle Server with the SQL*Plus program.
2. If using Instant Client, download it for Windows here: http://www.oracle.com/technology/tech/oci/instantclient/index.html. Be sure to use the 64 bit version of Instant Client if you are using a 64 bit edition of Windows. Only the "Basic" package is required for Timesheet. The "Basic Lite" package can be used but has limited support for non-Western languages. You may wish to install the SQL*Plus package for your own testing purposes but it is not required or used by Timesheet.
3. Unzip the Instant Client download to a directory like c:\instantclient_11_2
4. Important: You must now add that directory to the system PATH. If you fail to do this, when you try to connect you will get a message like: "Sorry, I cannot load the cx_Oracle module." To add this directory to the path, do this:
   4.1. Right click on "My Computer" (or "Computer") and select Properties.
   4.2. Click "Advanced System Settings" (or sometimes just "Advanced".)
   4.3. Click "Environment Variables."
   4.4. Under "System Variables", scroll down until you see "Path" (or "PATH").
   4.5. Select Path and click Edit.
   4.6. Move to either the beginning of the line, or else somewhere before any other Oracle related paths.
   4.7. Now type the path from above, such as C:\instantclient_11_2.
   4.8. Make sure it's separated from the other path components with a semicolon (;). So it should look like: c:\instantclient_11_2;c:\[other paths...]
   4.9. Make sure there is NOT a trailing \ (backslash) or / (forward slash) character at the end of the Oracle Instant Client path. Only a semicolon should follow it.
   4.10. Click OK.
   4.11. You must now restart the computer for this change to take effect.
   4.12. Do so and continue following these instructions.
   4.13. If you forgot to do the above step and got the "Sorry, I cannot load the cx_Oracle module" message, then click "Cancel Database Setup" and follow the above instructions. Then restart the "Setup Web Server and Database" program under Start → Programs → Journyx Timesheet.
   4.14. As mentioned above, if you get this error: ORA-24315: illegal attribute type then you should again check that the Instant Client directory is before any other Oracle directories in the System Path.
5. Once you have added the Oracle Instant Client directory to the system PATH you are ready to install Timesheet.
6. You should NOT normally need to create a "tnsnames.ora" file. Timesheet uses a "TNS-less" form of connection that can connect to any Oracle server that is accessible on your network. This applies whether you are using the Instant or Full Client, on both Windows and Unix.
7. Run the Timesheet installation program. Allow it to reboot your computer at the end and the "Setup Web Server and Database" program will run.
8. Choose the webserver such as IIS and other options as prompted.
9. You will be asked if you want to use the internal PostgreSQL connection or if you want an external database connection. Choose "Connect to an external database system."
10. Select the Oracle option.
11. Put in your connection information as prompted:
    Oracle hostname or IP address
    Oracle port (default is 1521)
    Oracle Service Name. This is defined in the "service_names" configuration parameter in Oracle server.
    User name: The Oracle account name.
    Password: the password for that Oracle account.
    Index tablespace: normally you can leave this blank unless you want the indexes on a separate tablespace. Fill in this info and click OK. If a connection cannot be established, for instance due to a wrong password or hostname, you will be given the opportunity to either try again with the same info (for instance, if the Oracle service was temporarily offline) or else to create a new connection with different info.

12. At this point it will create all the tables and views for Timesheet and will eventually send you to a login screen. It will pop up an alert message with the initial username and password.
13. If necessary, you can run a "restoredb" command from the command line to populate your Timesheet data from a .jx backup file.

Linux-only instructions:

1. Download the Instant Client for Linux here: http://www.oracle.com/technology/tech/oci/instantclient/index.html. Be sure to use the 64-bit version of Instant Client if you are using a 64-bit edition of Linux. Only the "Basic" package is required for Timesheet. The "Basic Lite" package can be used but has limited support for non-Western languages. You may wish to install the SQL*Plus package for your own testing purposes but it is not required or used by Timesheet.
2. Download the Timesheet installation .tar.gz file for your platform. If you are using a 64-bit edition of Linux, you need to use the 64-bit edition of Timesheet, as well as the 64-bit Oracle Instant Client.
3. Unzip the Instant Client download to a directory like /usr/local/instantclient_11_2
4. You should NOT normally need to create a "tnsnames.ora" file. Timesheet uses a "TNS-less" form of connection that can connect to any Oracle server that is accessible on your network.
5. A symbolic link must be created in the Oracle Instant Client directory. The Timesheet installer can create this for you if it has permissions, but just in case here is how to create the link manually.
   5.1. su to root, or sudo su -
   5.2. *cd /usr/local/instantclient_11_2*, or whatever directory you extracted the Instant Client files to.
   5.3. Run: ls libclntsh.so.* You should see a file listed like libclntsh.so.11.1 but the number might be different.
   5.4. Run: *ln -s [FILE from above] libclntsh.so* So something like: ln -s libclntsh.so.11.1 libclntsh.so
6. Un-tar-gz the Timesheet installer. Typically you run something like tar xzvf JournyxTimesheet_80_Linux.tar.gz
7. Change into the resulting jtime directory.
8. Set the ORACLE_HOME environment variable to the location you extracted Instant Client. For instance, export ORACLE_HOME=/usr/local/instantclient_11_2
9. Make sure there is NOT a trailing / (slash character) at the end of the ORACLE_HOME path. Having a trailing slash at the end of the path can cause installation problems or the connection error "Unable to acquire Oracle environment handle."
10. Run the ./jtinstall program. It will guide you through prompts for your Oracle information. Or you can save time by providing all the information at the command line in this format:
11. ./jtinstall --oracle "**username**/**password**@//**host**:**port**/**instance**" where:
    username is the Oracle account name.
    password is the Oracle account password.
    host is the Oracle hostname or IP address.
    port is the Oracle port (default is 1521).
    Instance is the Oracle Service Name. This is defined in the "service_names" configuration parameter in Oracle server.

    Be sure to enclose the entire connection string in double-quotes.
12. If necessary, you can run a "restoredb" command from the command line to populate your Timesheet data from a .jx backup file.

Change Log

1.0 Original document version.

2.0 Converted to Journyx Technical Documentation. Made several revisions and expanded material on database archive.

3.0 Updated for product version 8.0 and merged the Sysadmin Guide.

3.0.4 Added material for clustered application server setups.

3.0.5 Added material about configuring SSL on Lighttpd and creating self-signed SSL certificates for testing. Also added information about how to disable TRACE and TRACK verbs in Apache config.

3.0.6 Added information about customizing HTTP error response content.

3.0.7 Added material in the Security section about External Reporting and the internal PostgreSQL database account passwords.

3.0.8 Added material about new external Memcache settings new in version 8.7m3P1 and additional info about running multiple app servers (clustering) on Windows.

3.0.9 Updated the website links for external database setup instructions and other links.

3.1 Updated for Timesheet 8.8.

3.2 Updated for Timesheet 8.9.

3.3 Updated hardware requirements and support information.

3.4 Updated for Timesheet 8.9m1 and information about SQL Native Client drivers and installing on internationalized Windows.

3.5 Updated support website links. Added recommendations for Windows install user selection. Added some details on effects of config settings and memory utilization.

3.6 Updated Linux/Apache/FastCGI install details.

3.7 Updated for Journyx 9.5.

3.8 Update for Journyx 9.5m1

3.9 Update for Journyx 10.0.

3.10 Update for Journyx 10.1. Added information about mod_proxy_fcgi and Nginx.

3.11 Update to add database setup information into the document to replace knowledge base links.

4.0 Update for Journyx 11.0

(End of Document)