

IEPM-BW Installation Guide

This is an old copy of the Installation Guide see: [IEPM-BW Documentation](#).

The IEPM-BW system architecture is based on MySQL database on each individual monitoring host, various daemons and servers, and a crontab.

There are three file 'systems' associated with IEPM-BW Monitoring systems: the source code, the report storage, and the IEPM database which is a MySQL data base. Each monitoring host has these.

The IEPM data base is used for storage of the monitoring system's configuration and data storage.

The MySQL database contains all the configuration information for the probes that are to be made (node information, probe types, probe options, probe timing, etc.) and the specifications for the various analyses and graphs that are to be generated. It also contains tables where the probe data is stored and some tables to save the results of the various analyses.

The steps to be followed, in order, to install the monitoring host software are given in this installation guide. First of all the following requirement must be met regarding the software and hardware of the IEPM-BW machine.

IEPM-BW Hardware and Software Requirements

Hardware Requirements

The monitoring host should be a machine dedicated to the IEPM-BW software. The host must have enough CPU power to run the probes, drive the MySQL database, and run the analysis. It should also have enough disk space to support the database. The recommended monitoring host hardware configuration is:

- Dual cpu xeon 3 GHz processors with hyperthreading or better
- 4 Gigabytes of memory to allow for plenty of space for MySQL and TCP buffers and workspace as well as a minimum amount of paging
- 1 Gigabit network interface, although a 10 Gigabits nic is also acceptable
- 100 Gigabytes of disk space to allow for the MySQL data base and and all the analysis reports which are generated.
- A separate disk to back up the MySql data base contents

The target host does not need to be a dedicated machine, but it should not be a busy machine.

- A gigabyte of memory is recommended
- If the machine is dedicated to being a target, 1 Gz of CPU is enough.
- Very little disk space is required. The server code is small and can reside in the home directory of the account it runs from.

Software Requirements

Following are the software requirements for the IEPM-BW monitoring node.

- Recommended operating system is the latest stable version of RedHat or any flavour of Fedora, more suitably Fedora Core 5.
- Two accounts should be created on the monitoring machine as these are needed to install and run IEPM-BW.
 - 'iepm' is a user account and is used for running IEPM-BW.
 - Account = iepm, home directory = /home/iepm
 - Second account is an account with root privileges. This is account is used for installation and administration. It's 'cyrus' in my case.
 - Account = cyrus, home directory = /home/cyrus
- You can have your own account, but don't forget to replace it at every place with your own account.
- An apache web server has to be available, and the recommended document root is '/var/www'.
- Standard MySQL must be installed on the system. Most recommended is the latest stable release, as this will facilitate assuring the upward compatibility of the code.
- Make sure that the system is configured to autostart MySQL and httpd (apache web server) upon booting. On some systems this can be done with 'chkconfig'. Commands are

```
chkconfig httpd on
chkconfig mysqld on
```

- The following /etc/sysctl.conf parameters are recommended for optimum performance

```
/proc/sys/net/core/wmem_max=20971520
/proc/sys/net/core/rmem_max=20971520
/proc/sys/net/core/rmem_default=65536
/proc/sys/net/core/wmem_default=65536
/proc/sys/net/ipv4/tcp_rmem=4096 87380 20971520
/proc/sys/net/ipv4/tcp_wmem = 4096 65536 20971520
```

The following ports must be open for the probes

Test Name	Port#
iperf	5000
owamp(2.0) link	4824
thrulay	5003
pathchirp	8365 udp
pathload	55001 udp
pathload	55002 tcp

Keep in mind to open port for each and every other service you run. e.g. HTTP, NTP etc

- To allow for running OWAMP, the monitoring and target hosts should be configured with 4 NTP servers. The OWAMP documentation discusses how to setup NTP.
- The latest version of JAVA must be installed on the monitoring host.
- Gnuplot 4.0 is required and must be installed on the monitoring host machine
- Perl should be installed locally on the machine. It can be either in `/usr/bin/perl` or `/usr/local/bin/perl`. There should be a link from where it doesn't exist to where it exists. Suppose if Perl path is `/usr/bin/perl`, its link should be created at `/usr/local/bin/perl`. Perl modules must be installed on the system.

```
Date::Calc
Date::Manip
Date::Parse
Time::localtime
Time::Local
Time::Parse
Sys::Hostname
Proc::ProcessTable
Bundle::DBD::mysql
getopts.pl
getopt.pl
Getopt::Std
strictIO::Handle
File::Temp
Soap::Lite
CGI
Bit::Vector
GD
```

Don't forget to set the time zone in `Date::Manip` configurations along with other configurations.

Important notes for later reference:

- To start the mysql daemon, use `mysqld_safe`
- To set the root password after installation use: `mysqladmin -u root password "new password"`
- To shut mysql down, use `mysqladmin -u root -p shutdown`

IEPM-BW Software Pre-Installation

The following instructions must be performed as root

- Decide what accounts are going to be needed. Assume the account 'cyrus' will have root privileges and be used for operations requiring root. Assume that the monitoring will run under the non-root access account 'iepm'. Both, for purposes of this documentation are assumed to be in group `<account group>`, `iepm`. For this example, I will assume that the home directory for the 'cyrus' account is `/home/cyrus`, and the home directory for the 'iepm' account is `/home/iepm`. For the sake of consistency between monitoring systems, the account 'iepm' with `/home/iepm` is strongly recommended.
Download the complete package and place the source code in the directory `/home/iepm/v3src`
- The monitoring host has a name. This is referred to as `<fully qualified monitoring host name>`. e.g. `iepm-ncp.ncp.edu.pk` or `iepm-bw.slac.stanford.edu`
- The monitoring host should be given an `<aliasname>` that starts with 'iepm-bw'. The idea is to hide the real name of the node, but provide it with a name that can recognize its place in the world. This is important. Examples include:

```
iepm-bw.twaren.net
iepm-bw.cern.ch
iepm-bw.snv.ul-org
iepm-bw.fzk.de
```

- If the account `mysql:mysql` has not been allocated, allocate it by using the following commands:

```
groupadd -g 20000 mysql
useradd -u 20000 -g mysql mysql
```

Normally the account is created itself along with the installation of mysql.

- Make the mysql directory `/home/iepm/mysql`.

```
mkdir /home/iepm/mysql
chown mysql:mysql /home/iepm/mysql
```

- Create a configuration file for `/etc/my.cnf` which MySQL will use when you install the database. Copy the following contents in to `my.cnf`.

```
[mysqld]
datadir=/home/iepm/mysql
socket=/home/iepm/mysql/mysql.sock
port=3306
[mysqld_safe]
datadir=/home/iepm/mysql
socket=/home/iepm/mysql/mysql.sock
port=3306
[mysql.server]
datadir=/home/iepm/mysql
socket=/home/iepm/mysql/mysql.sock
port=3306
[client]
socket=/home/iepm/mysql/mysql.sock
port=3306
```

- If mysql is already running, it is running with the 'test' database. Kill the mysql daemons.
Restart MySQL with `mysqld_safe &`. This will restart the MySQL server with the configuration file `/etc/my.cnf`.
- Create the data base by executing `mysql_install_db`.
- Change the ownership of `/home/iepm/mysql` by the command `chown chown -R mysql:mysql /home/iepm/mysql`.
- Set the database root password with the following command.

```
mysqladmin -u root password <new password>
```

- You are now ready to create the directories with `/home/iepm/mysql` that must be owned by the `iepm` account. These directories are used by the `iepm` monitoring to track the state of the monitoring system. Execute the following commands with '`iepm:iepm`' with '`iepm`' replaced by the appropriate group for the '`iepm`' account. i.e. it would be `iepm:< youraccountgroup >` in your case.

```
# The data directory is where the results from the probes are stored.
# These files are picked up by the 'load-datad' daemon and put into the database tables.
    mkdir /home/iepm/mysql/data
    chown iepm:iepm /home/iepm/mysql/data
# the logs directory contain the log files from each process
    mkdir /home/iepm/mysql/logs
    chown iepm:iepm /home/iepm/mysql/logs
# The pids from the daemons are stored here
    mkdir /home/iepm/mysql/pids
    chown iepm:iepm /home/iepm/mysql/pids
# The files in the keepalives directory are used by the monitoring software to ascertain that
# the daemons are running
    mkdir /home/iepm/mysql/keepalives
# prime the pump with:
    touch /home/iepm/mysql/keepalives/traced.alive
    touch /home/iepm/mysql/keepalives/pingd.alive
    touch /home/iepm/mysql/keepalives/bw-synched.alive
    touch /home/iepm/mysql/keepalives/pathchirpd.alive
    touch /home/iepm/mysql/keepalives/load-datad.alive
    touch /home/iepm/mysql/keepalives/load-scheduled.alive
    touch /home/iepm/mysql/keepalives/owpingd.alive
# set the permissions so that the iepm account can access them
    chown -R iepm:iepm /home/iepm/mysql/data
    chown -R iepm:iepm /home/iepm/mysql/logs
    chown -R iepm:iepm /home/iepm/mysql/keepalives
    chown -R iepm:iepm /home/iepm/mysql/pids
```

- The output from the analysis and reports must go into a directory which is writeable by the 'iepm' account. Generally this is '/home/iepm/public_html'. Make this directory with by using the commands:

```
mkdir /home/iepm/public_html
mkdir /home/iepm/public_html/<aliasname>
chown -R iepm:<account> /home/iepm/public_html
```

Where <account> is the account your UNIX id is under. For example, for 'cyrus:iepm' <account> would be replaced by iepm.

- Create a link to this area from /var/www/html as your document root of apache will be /var/www/html.

```
ln -s /home/iepm/public_html/<aliasname> /var/www/html/<aliasname>
```

- IEPM-BW requires a simple configuration file, '/etc/iepm.cnf'. Create the file by the command

```
mkdir /etc/iepm.cnf
```

Copy the following contents into the file and make the required changes.

```
# required iepm configuration parameters
# /etc/iepm.conf
    dataBase = "iepm"
    dataBaseHost = "<fully qualified monitoring host name>"
    dataBaseDir = "/home/iepm/mysql"
    iepmSrcDir = "/home/iepm/v3src"
    updateAcct = "iepm"
    acctGroup = "<account group>"
    readAcct = "readonly"
# This is provided as the monitoring host and database host could be
# different machines.
# It is not advisable for them to be different. In monitoring a network,
# one should avoid using the network for the monitoring control and data # logging.
    monHost = "<fully qualified monitoring host name>";
    aliasName = "<aliasname>";
    monHostip = "<monitoring host ip address>";
    mysqlport = 3306;

#Connie Logg 5/12/04 cal@slac.stanford.edu <- configurator's name and date please
```

An example iepm.cnf file is below to help you in changing parameters specific to your site.

```
#required iepm configuration parameters
# /etc/iepm.conf

dataBase = "iepm"
dataBaseHost = "iepm-ncp.ncp.edu.pk"
dataBaseDir = "/home/iepm/mysql"
iepmSrcDir = "/home/iepm/v3src"
updateAcct = "iepm"
acctGroup = "iepm"
readAcct = "readonly"
# This is provided as the monitoring host and database host could be different machines
# It is not advisable for them to be different. In monitoring a network, one should avoid using the
# network for the monitoring control and data logging.
monHost = "iepm-ncp.ncp.edu.pk";
aliasName = "iepm-ncp.ncp.edu.pk";
monHostip = "202.83.167.108";
mysqlport = 3306;
```

IEPM-BW Database Setup

IEPM-BW Database Setup

A MySQL system has its own set of users which are distinct from the unix users, although the names can be the same. The recommended users are:

1. iepm - this is the account the monitoring system runs with
2. readonly - this is a readonly account for general access to the data
3. apache (or nobody) - the account used by httpd to access the database
4. cal (or other user) - the administrator account
5. root - used for MySQL system administration

I remind that these accounts are Mysql user accounts and should not be confused with system user account.

The accounts are defined by issuing grants to the account for accessing the data base.
Create a file named pws in /home/iepm/mysql i.e.

```
touch /home/iepm/mysql/pws
```

edit the file and put the password of your iepm mysql account in it.

Create the IEPM data base. Log into MySQL with the root account and password and issue the following command:

```
create database iepm;
```

The following grant commands can be set up in a text file for 'batch' entry into MySQL, or they can be entered one by one. The root account and password must be known to set up the grants. Make sure, you put the passwords in and don't use the string 'password'. Note the host name component of the grant. All these forms may not be necessary, however I have found that they are for various means of access.

```
#For mysql administrator ('cyrus' in this case) grant all on *.* to cyrus@localhost identified by 'password'
with grant option;
grant all on *.* to cyrus@202.83.167.108 identified by 'password' with grant option;
grant all on *.* to cyrus@iepm-ncp identified by 'password' with grant option;
grant all on *.* to cyrus@'iepm-ncp.ncp.edu.pk identified by 'password' with grant option;
grant file on *.* to cyrus;
```

```
# For the iepm account used by iepm to load data into the data base:
grant all on iepm.* to iepm@localhost identified by 'password';
grant all on iepm.* to iepm@202.83.167.108 identified by 'password';
grant all on iepm.* to iepm@iepm-ncp identified by 'password';
grant all on iepm.* to iepm@'iepm-ncp.ncp.edu.pk' identified by 'password';
grant file on *.* to iepm;
```

```
# For the readonly account (report generation) - no password
grant select on iepm.* to readonly@localhost;
grant select on iepm.* to readonly@'202.83.167.108';
grant select on iepm.* to readonly@iepm-ncp;
grant select on iepm.* to readonly@'iepm-ncp.ncp.edu.pk';
grant file on *.* to readonly;
```

```
# For the web server account (may be nobody or apache or other) - no password
grant select on iepm.* to apache@localhost;
grant select on iepm.* to apache@'202.83.167.108';
grant select on iepm.* to apache@iepm-ncp;
grant select on iepm.* to apache@'iepm-ncp.ncp.edu.pk';
grant file on *.* to apache;
```

Creating Tables

Create the tables in iepm database. The scripts of these tables can be found here. However you can use the SQL queries in the files in create tables directory. Create tables by giving these files as input to mysql. Please check if you might need to change nodes.txt in case you have different paths for ping, grep, traceroute etc. Use the command

```
mysql -u root -p > file_name Database name
```

For example, for creating monhost table in iepm database

```
mysql -u root -p > monhost.txt iepm
```

It will prompt you for password; enter your mysql root password.

Loading the IEPM Database

Next comes the loading of data in to the database tables. Look at the following links of tables at SLAC IEPM node to have some idea of the data to be inserted in the database tables.

<http://www.slac.stanford.edu/comp/net/iepm-bw.slac.stanford.edu/monitoring-hosts.html>
<http://www.slac.stanford.edu/comp/net/iepm-bw.slac.stanford.edu/NODESPECS.html>
<http://www.slac.stanford.edu/comp/net/iepm-bw.slac.stanford.edu/targets-iepm-bw.slac.stanford.edu.html>
<http://www.slac.stanford.edu/comp/net/iepm-bw.slac.stanford.edu/toolspecs.html>
<http://www.slac.stanford.edu/comp/net/iepm-bw.slac.stanford.edu/plotspecs/pltspecs-entries.html>

The scripts for populating the database tables are located in v3src/mysql. You can load tables with data using CSV files. Other way you can also create your own queries, put them in a file and give as input to mysql using the command

```
mysql -u root -p > file_name databasename
```

At the moment, I recommend creating table by using queries.
For reference, see the following links

[Populating the NODES Table](#)
[Populating the GROUP Tables](#)
[Populating the MONHOST Table](#)
[Populating the TOOLSPECS Table](#)

For more information on the iepm-bw mysql table setup see [IEPM Database Table Summary](#).

IEPM-BW Software Installation

First you will need the iepm-bw source code. Typically this is obtained from SLAC by an email request to cottrell@slac.stanford.edu. He will tar up the entire v3src directory, below are the commands he will probably use:

```
>cd $bandsrc
>tar -cvf v3src .tar
>gzip -c v3src.tar /tmp/v3src.tar.gz
>ls -l /tmp/v3src.tar.gz
-rw-r--r-- 1 cottrell sf 125632972 May 17 12:34 /tmp/v3src.tar.gz
>rm v3src.tarcp /tmp/v3
>mv /tmp/v3src.tar.gz ./
>ls -l v3src.tar.gz
-rw-r--r-- 1 cottrell sf 125632972 May 17 12:34 v3src.tar.gz
>cd /afs/slac/public/users/cottrell
>cp $bandsrc/v3src.tar.gz ./
```

This requires a lot of disk space (e.g. v3src.tar is ~ 180MBytes). It creates a file \$bandsrc/v3src.tar.gz which is probably too big to email so it is made available by anonymous ftp. To access it use:

```

>ftp ftp.slac.stanford.edu
Connected to ftp.slac.stanford.edu (134.79.18.30).
220=====
220-By using this system you expressly consent to the terms and
...220 FTP server ready.
Name (ftp.slac.stanford.edu:cottrell): anonymous331 Anonymous login ok, send your complete email address as
your password.
Password:
230=====
230-
230-Stanford Linear Accelerator Center Anonymous FTP Server
230-
230=====...
ftp> binary
200 Type set to I
ftp>cd users/cottrell
ftp> ls
227 Entering Passive Mode (134,79,18,30,188,42).
150 Opening ASCII mode data connection for file list
dr-xr-xr-x  2 ftp      ftp          4096 May 17 19:45 .
dr-xr-xr-x  2 ftp      ftp          4096 May 14 18:21 ..
-r--r--r--  1 ftp      ftp           335 Oct  5  2001 identity.pub
-r--r--r--  1 ftp      ftp           304 Feb  9  1996 pgp.publickey
-r--r--r--  1 ftp      ftp      125632972 May 17 19:45 v3src.tar.gz
226 Transfer complete.ftp> get v3src.tar.gz
local: v3src.tar.gz remote: v3src.tar.gz
227 Entering Passive Mode (134,79,18,30,188,44).
150 Opening BINARY mode data connection for v3src.tar.gz (125632972 bytes)
226 Transfer complete.
125632972 bytes received in 28.4 secs (4.3e+03 Kbytes/sec)
ftp>quit
>

```

You will need to unzip and detar the file using: `tar -xzf v3src.tar.gz`

Log onto the monitoring host node under the 'iepm' account.

Now configure the 'config' directory in v3src. The following files may need configuration:

1. The 'config' directory contains a sample `.cshrc`. Modify this to match the node being installed and copy it to `/home/iepm/.cshrc`. This will defined where java is located, and two environment variables "`$bandsrc`" which points to the v3src directory and "`$banddata`" which points to the directory where the data and reports are stored. Note that there is a link from `/var/www/html` to this directory.
2. `cleanup-list` - should be configured correctly. If there are processes which are known to hang, they should go in this file. 'bw-cleanup' uses this file to clean processes known to hang (now or in the past). If the process with the name in this list exists longer than the number of minutes indicated on its line, it will be killed.
An example is:

```

# cleanup process list
# Connie Logg 5/18/06 cal@slac.stanford.edu
post-test,120
gnuplot,5
triganal,120
runperiod,120
pathload_rcv,3
pathchirp_rcv,3
/bin/ping,3
/bin/owping,3
/bin/iperf,3
/bin/tlaytcp,3
/bin/bw-iperf-client,3

```

3. `owampd.conf.template`, `owampd.limits`, and `owampd.keys` are configuration files for owamp. `owampd.limits` and `owampd.keys` should be ok. Look at `owampd.conf.template.datadir` and `vardir` are defined to be `/home/iepm/owamp/data` and `/home/iepm/owamp/run` respectively. If this is ok (recommended default), save `owampd.conf.template` as `owampd.conf`.
Then create the directories:


```
mkdir /home/iepm/owamp
      mkdir /home/iepm/owamp/data
      mkdir /home/iepm/owamp/run
```

4. `servers.alive` may need to be configured. This is the file that has the information for starting the servers. It is used by `keep-servers-alive` to start, and if necessary, restart the servers. For a standard monitoring host, this file should be:

```
bw-iperf-server,bin,-s -p 5000 -w 20M
thrulayd,bin,
pathload_snd,bin, -q -i
map-updated,,
pathchirp_snd,bin,
owampd,bin, -c /home/iepm/v3src/config -Z >& /tmp/owampd.log &
```

The first field is the name of the script. The second field is the directory in `$iepmSrcDir` where the script resides. The third is a list of parameters to start it with.

1. Make copies of `/etc/my.cnf` and `/etc/iepm.cnf` in the config directory. They are used to provide configuration information to the CGI scripts.

```
cp /etc/my.cnf /home/iepm/v3src/config
cp /etc/iepm.cnf /home/iepm/v3src.config/iepm.cnf.<aliasname>
```

2. Install JAVA, if required. If it must be installed, the recommended installation directory is `/home/iepm`. To install it, copy the 'JDK...bin' in `home/iepm/iepmtools` to `/home/iepm` and execute it.
3. Configure Geoplot. <http://www.slac.stanford.edu/comp/net/bw-html/v3plm.html#geoplot>
4. Now assuming that database tables are loaded, run the various reports for them. `report-nodes` should be run first. If `MONHOST` is not set up correctly, none of the reports will run. You must fix `MONHOST` first.
5. Other reports to run are:

```
report-monhost
report-nodegroups
report-nodespecs
report-plotspecs
report-table-structure
report-toolspecs
```

6. Once all the reports run, you are ready to try the probes. 'schedule-load' will force the probes to be scheduled and run. Look in `$mysqldb/data` and check the data files that are output from the probes running. If they look ok, you can execute the various data loading scripts called by `load-datad`. These include:

```
load-ping-data
load-trace-data
load-iperf-data
load-tlayctp-data
load-trace-data
load-pathchirp-data
load-pathload-data
```

If all of the above tests work, and the data base is loaded with all probes, nodes, plotspecs, etc. then you can load the crontab. Crontab files are located in `v3src/crontabs`. You should use the one with name `crontab.iepm`.

```
Crontab -u username crontab.iepm
```

`crontab -l` will give you the listing of cronjobs for the logged in account.

This should start the system up. If there are problems, be sure to check the `/home/iepm/mysql/logs` directory for the output from the cronjobs.