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DB2 Information Management
Software

IBM

Installing the DB2 Universal Database (DB2 UDB) Plug-in for the Nagios System Monitor

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1. Introduction and Overview

The Nagios system monitor is an open source project that aims to provide an easy tool for monitoring computer systems remotely. It uses a plug-in architecture that allows great flexibility and customization and gives a system administrator the ability to add a plug-in to monitor anything that can be automated by scripting. Nagios also comes with a default set of plug-ins that cover the most commonly checked functions such as the ability to ping a particular server. The standard plug-ins also monitor for things such as server outages, network activity, and service status, alerting the system administrator to any potential problems. Additional plug-ins beyond the default set can be written in different languages such as Perl (which this plug-in uses) or C. The official third-party plug-in repository is http://www.nagiosexchange.org where many plug-ins are available for download. More information on plug-in development can be found at http://nagiosplug.sourceforge.net/.

By completing the steps in this paper, you will install the IBM® DB2® Universal Database™ (DB2 UDB) plug-in for Nagios running on the Linux® platform. This plug-in can be used to remotely monitor a DB2 UDB instance through a standard Web browser using a simple graphical interface that allows greater detail when requested. This paper also includes a detailed description of the installation of the DB2 UDB Application Development Client (DB2 UDB ADCL) as well as the Perl DB2 UDB Database Interface (Perl DB2 UDB DBI), both of which are required by the plug-in. This paper will not discuss how to set up the Nagios system monitor; that information can be found at http://www.nagios.org/docs/.

Target Audience for this White Paper
- DB2 UDB database administrators
- Linux system administrators

2. Before You Begin

Below you will find information on knowledge requirements, as well as the software configuration used to set up the environment depicted in this paper. It is important that you read this section prior to beginning any setup.

2.1 Knowledge Requirements

- Fundamental understanding of Linux system administration
- Fundamental understanding of DB2 UDB

2.2 Software Configuration Used

The minimum software requirements for running DB2 UDB are listed at http://www.ibm.com/db2/linux/validate. The software requirements for Nagios are found at http://nagios.sourceforge.net/docs/1_0/about.html. Nagios also comes as an optional software package on some Linux distributions. Most Linux distributions come with Perl preinstalled, but if a particular installation does not, more information can be found at http://www.perl.org. Software requirements for the Perl DB2 UDB DBI are located at http://www-306.ibm.com/software/data/db2/perl/. Listed below are the actual software packages used to set up the environment for this paper.

- Operating System: SUSE Linux Enterprise Server 9 (kernel version 2.6.5-7).
                         139-default

- DB2 Products: DB2 UDB Enterprise Server Edition Version 8.2 and the
                         DB2 UDB Application Development Client Version 8.2
- Nagios: Nagios 1.2b
- Perl: Perl Version 5.8.3 (minimum 5.005_03)
- Perl DB2 UDB DBI: Perl DB2 UDB DBI Version 0.78

3. Installation Instructions

The following steps are required for a successful installation of the DB2 UDB plug-in for Nagios as well as all of its required software in order to be able to monitor a DB2 UDB database with it:

1. Set up the DB2 UDB Application Development Client
2. Install the Perl DB2 UDB DBI
3. Set up the DB2 UDB plug-in for Nagios

Other documents describe how to install both Nagios and DB2 UDB so those steps will not be covered here.

3.1 Set up the DB2 UDB Application Development Client
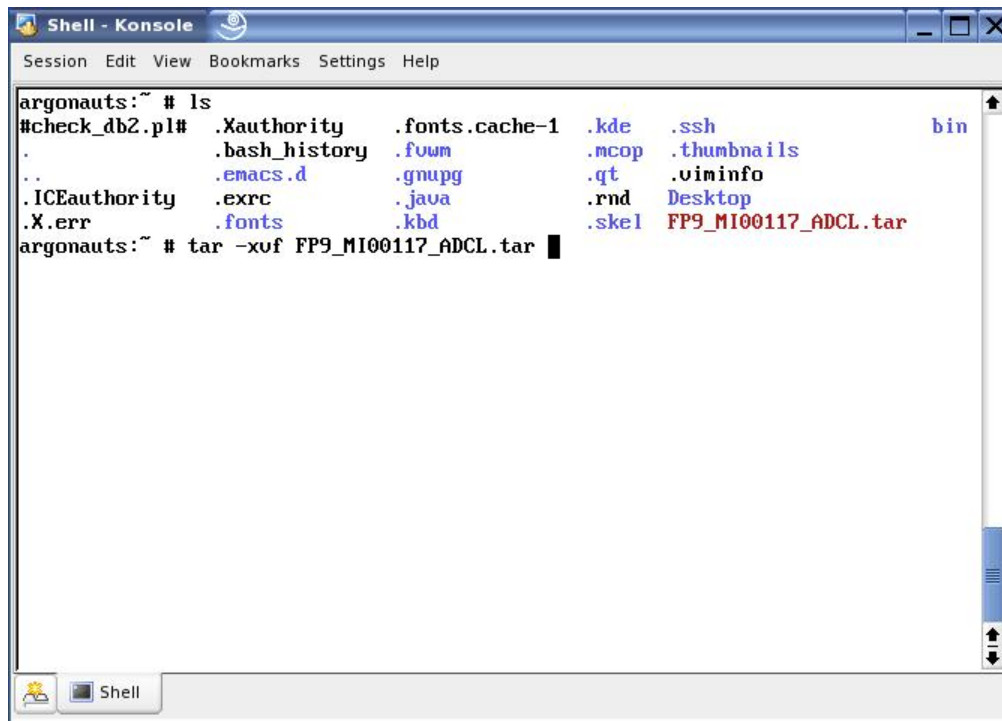
The DB2 UDB Application Development Client is required before the Perl DB2 UDB DBI can be installed on the host machine. As the name suggests, the DB2 UDB ADCL provides tools and interfaces used by programmers in developing applications that interact with DB2 UDB databases. Follow these 12 steps to install the DB2 UDB ADCL.

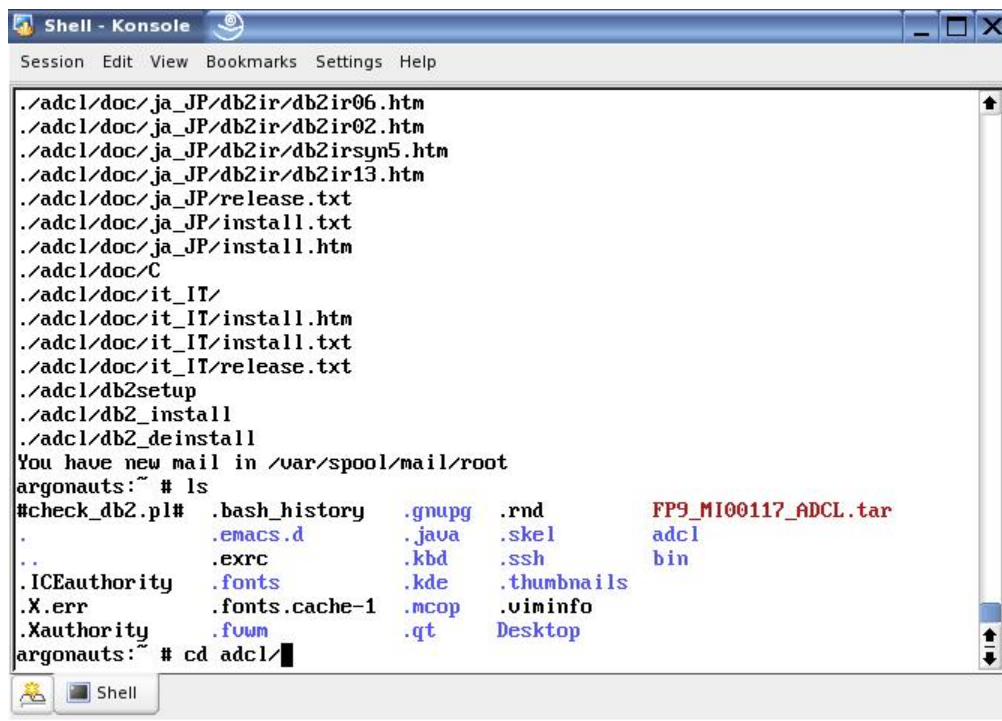1. As root, download the DB2 UDB Application Development Client for your operating system from http://www-306.ibm.com/software/data/db2/udb/support/downloadv8.html
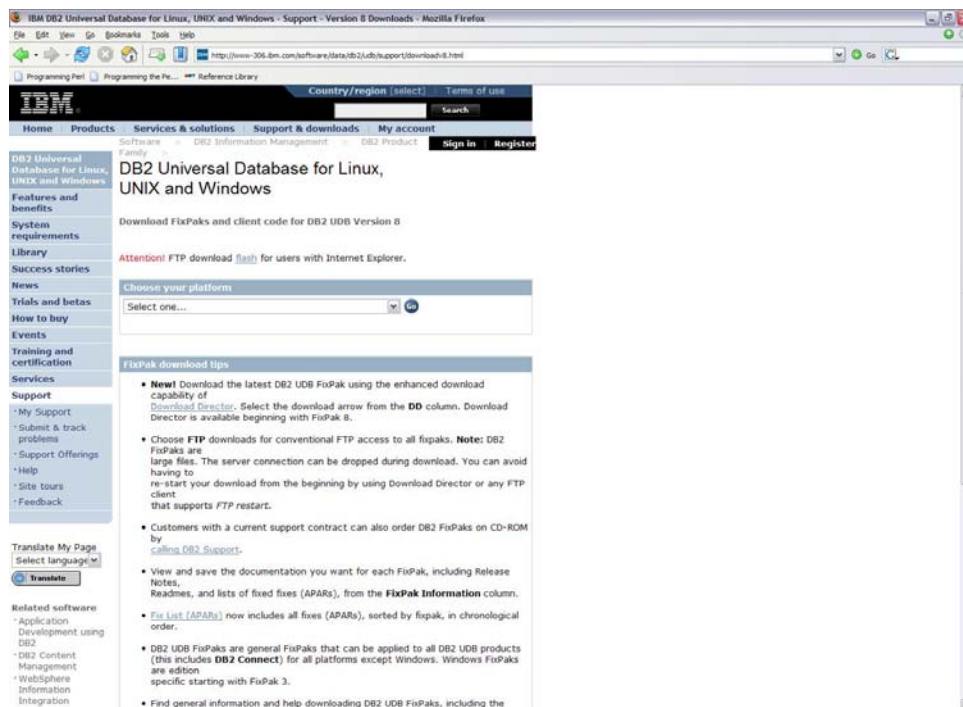
2. Un-tar the downloaded ADCL tar file using `tar -xvf <version>.tar`

```
argonauts:~ # ls
#check_db2.pl#   .Xauthority     .fonts.cache-1   .kde     .ssh               bin
.                .bash_history   .fvwm            .mcop    .thumbnails
..               .emacs.d        .gnupg           .qt      .viminfo
.ICEauthority    .exrc           .java            .rnd     Desktop
.X.err           .fonts          .kbd             .skel    FP9_MI00117_ADCL.tar
argonauts:~ # tar -xvf FP9_MI00117_ADCL.tar █
```

3. Go into the new ADCL directory with `cd adcl/`
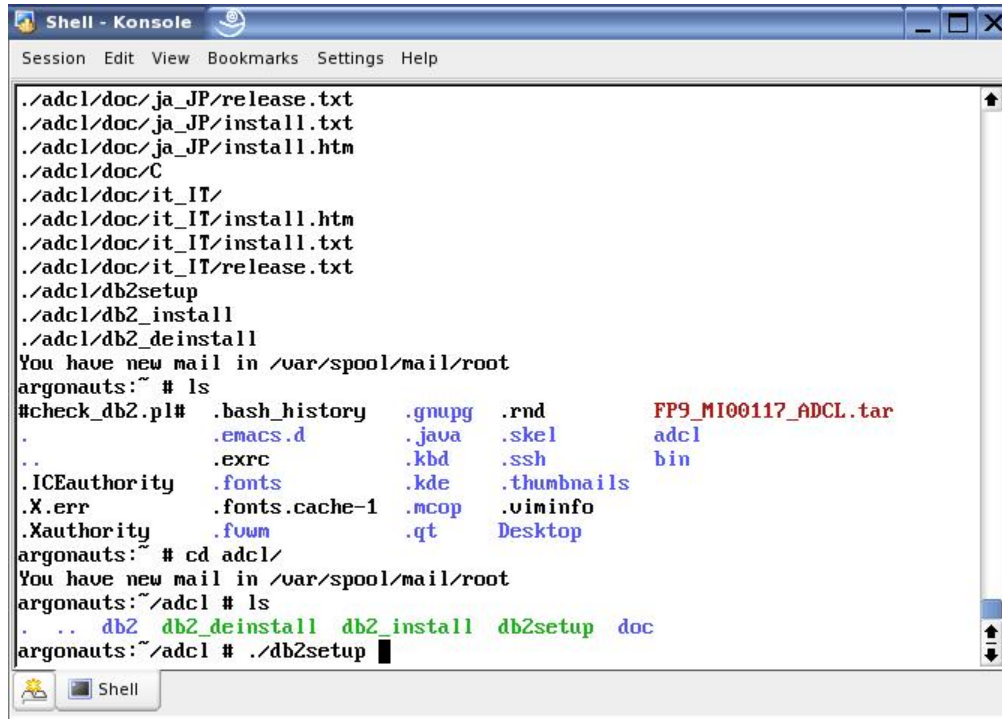
```
./adcl/doc/ja_JP/db2ir/db2ir06.htm
./adcl/doc/ja_JP/db2ir/db2ir02.htm
./adcl/doc/ja_JP/db2ir/db2irsyn5.htm
./adcl/doc/ja_JP/db2ir/db2ir13.htm
./adcl/doc/ja_JP/release.txt
./adcl/doc/ja_JP/install.txt
./adcl/doc/ja_JP/install.htm
./adcl/doc/C
./adcl/doc/it_IT/
./adcl/doc/it_IT/install.htm
./adcl/doc/it_IT/install.txt
./adcl/doc/it_IT/release.txt
./adcl/db2setup
./adcl/db2_install
./adcl/db2_deinstall
You have new mail in /var/spool/mail/root
argonauts:~ # ls
#check_db2.pl#   .bash_history   .gnupg    .rnd        FP9_MI00117_ADCL.tar
.                .emacs.d        .java     .skel       adcl
..               .exrc           .kbd      .ssh        bin
.ICEauthority    .fonts          .kde      .thumbnails
.X.err           .fonts.cache-1  .mcop     .viminfo
.Xauthority      .fvwm           .qt       Desktop
argonauts:~ # cd adcl/█
```

4. Begin installation of the DB2 UDB Application Development Client by running `./db2setup`

Installing the DB2 UDB Plug-in for Nagios
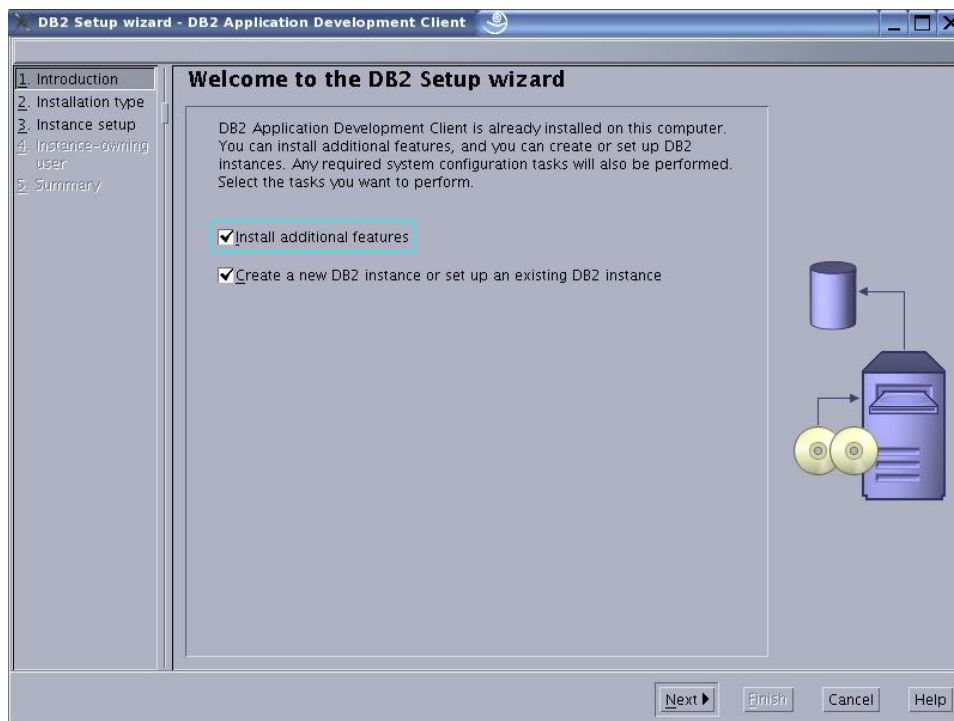

5. Once the DB2 UDB Setup program has started, click **Install Products**.
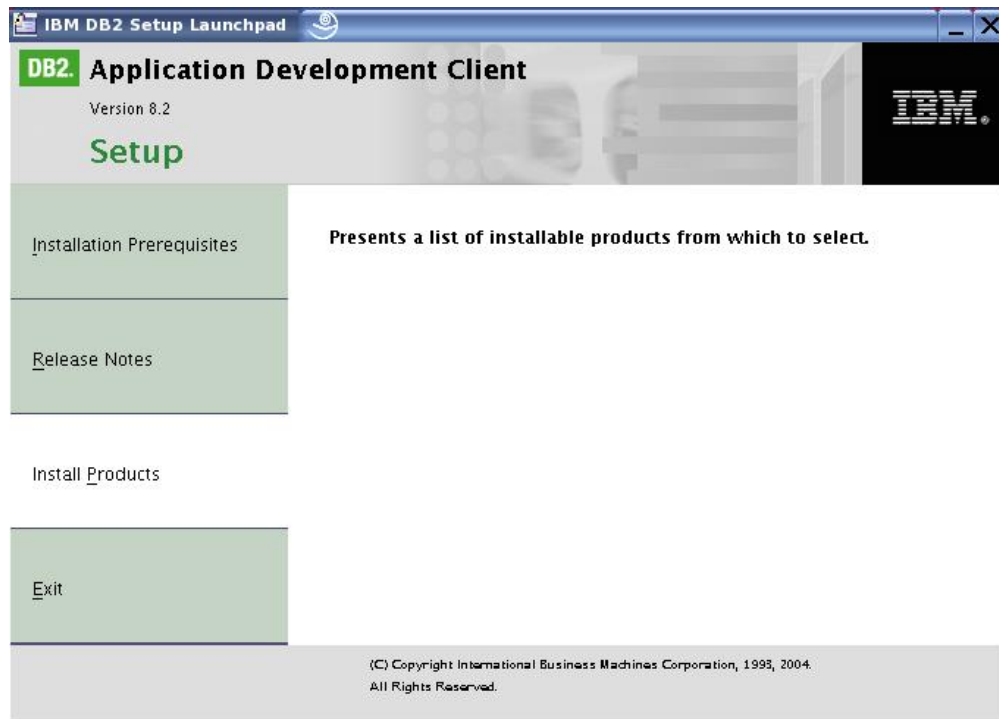
6. Click **Next** in the DB2 Setup launchpad to continue.
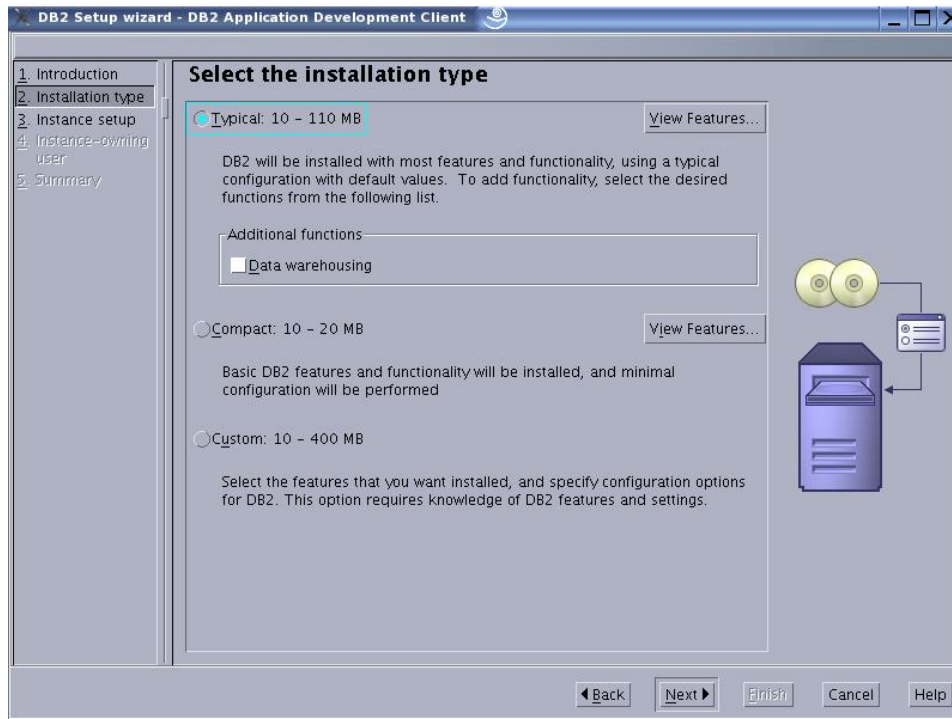
Page 6

7. Select or deselect the features you want to install, and then click **Next.** (Both options are selected by default.)
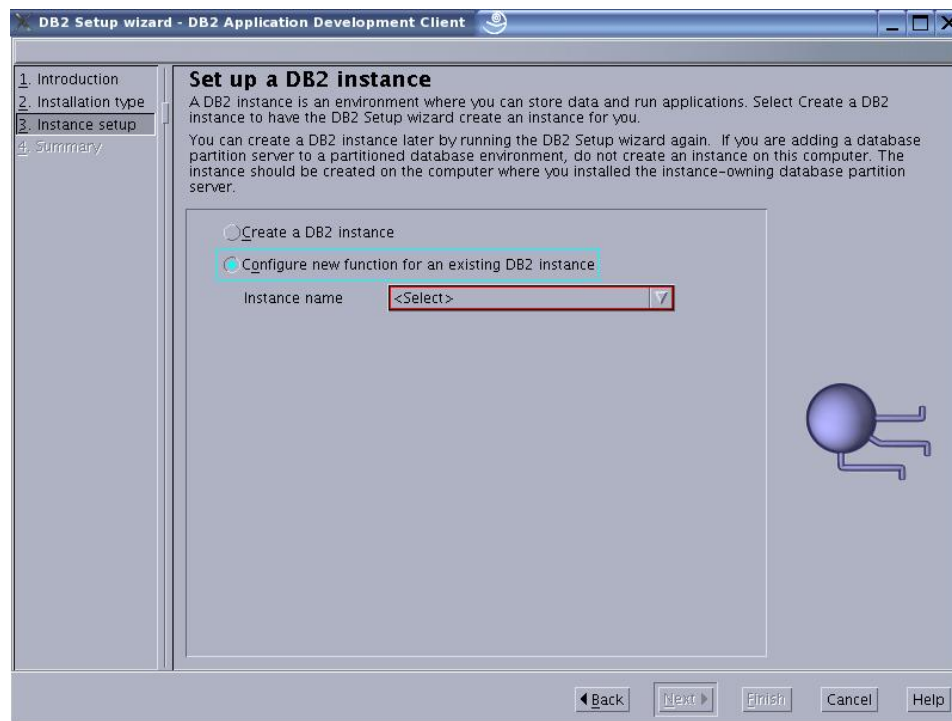

8. Select the installation type, and then click **Next.**

9. Click the **Configure new function for an existing DB2 instance** check box to configure an existing instance with the ADCL.

10. Select the instance to be modified from the drop-down menu, and then click **Next**.
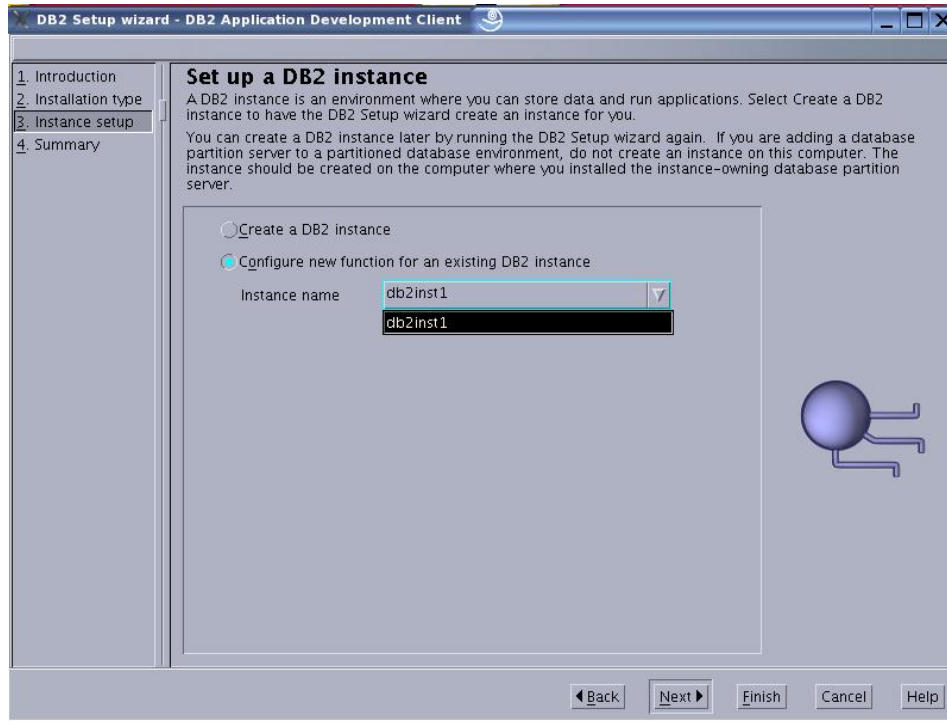
11. You can review the current settings by using **Back** and **Next.** When you are satisfied with the settings, click **Finish** to start the installation.
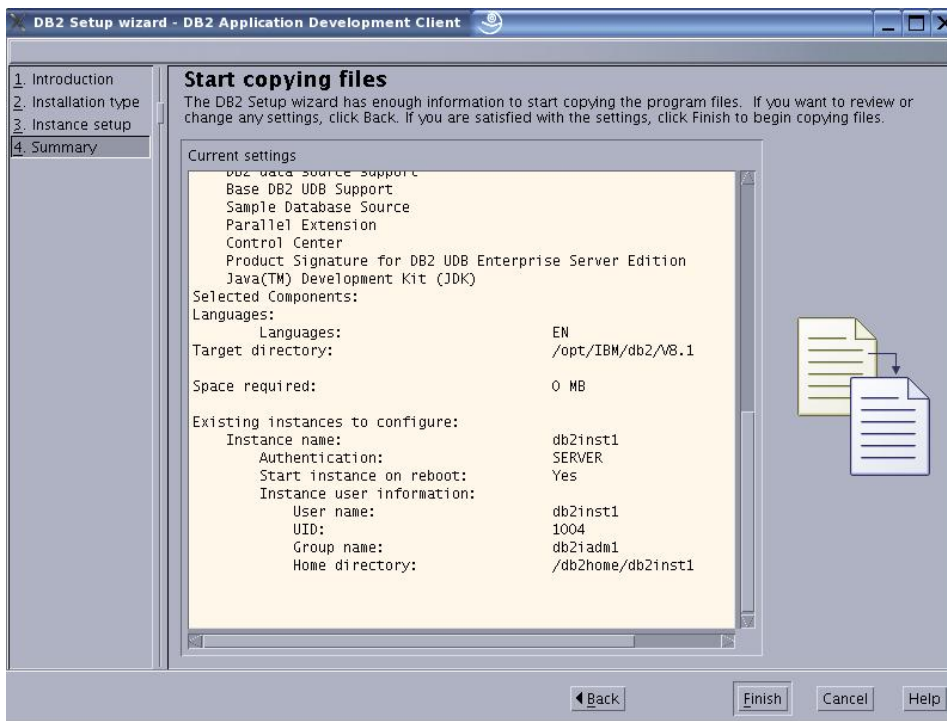
12. Once the installation has finished, click **Finish** to close the installer. The DB2 UDB Application Development Client is now installed.

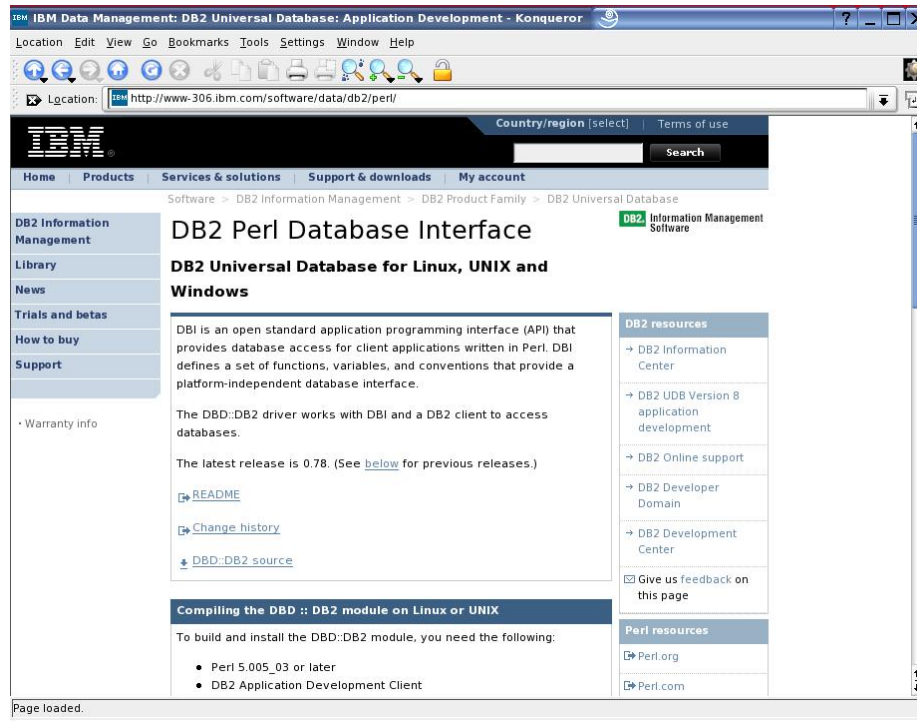*Installing the DB2 UDB Plug-in for Nagios*
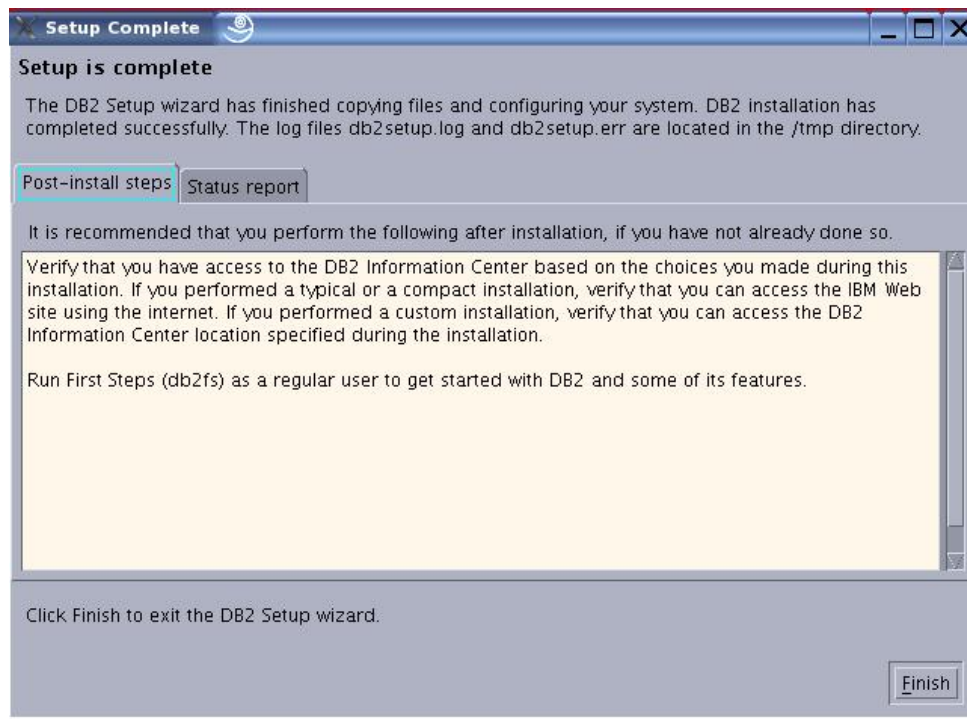

3.2 Install the Perl DB2 UDB DBI

Perl allows the use of modules to expand its capabilities beyond what are present with the default set of instructions. One such module is the database interface (DBI), which allows Perl to use a standard set of subroutines to interact with databases, although each database requires its own implementation of the DBI. (DB2 cannot use the same DBI as other databases.) The DB2 UDB DBI, as its name suggests, is the Perl module that allows scripts written in Perl to interact with a DB2 UDB database. More information about the Perl DBI can be found at http://dbi.perl.org/. Follow these eight steps to install the Perl DB2 UDB DBI.

1. As root, download the Perl DB2 UDB DBI from http://www-306.ibm.com/software/data/db2/perl/
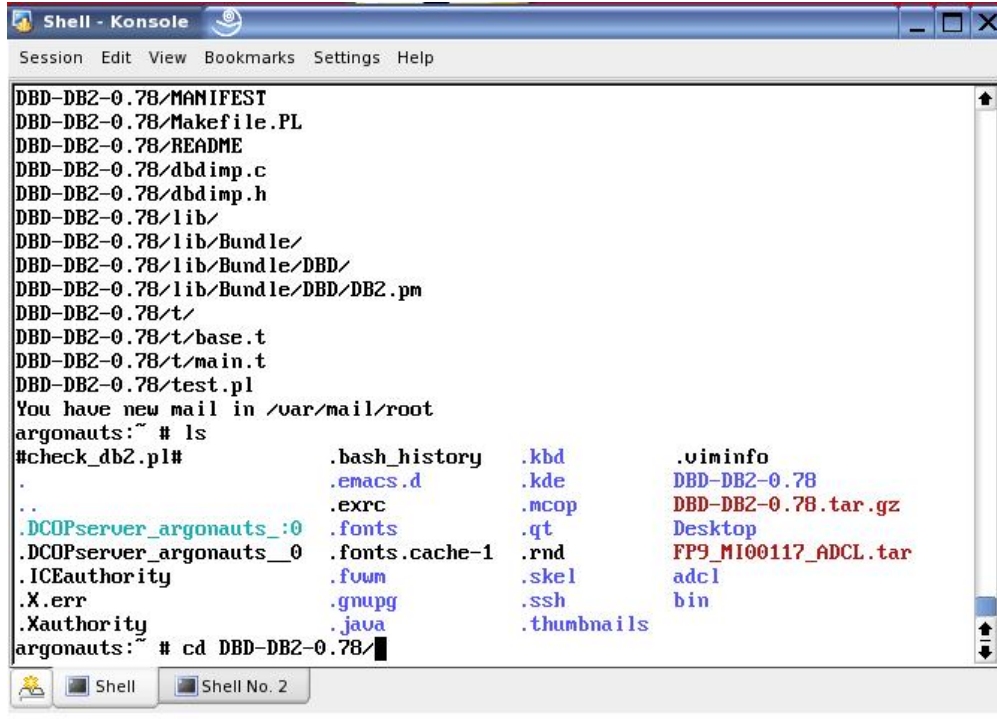
2. Find the DB2 UDB Perl DBI and un-tar it with `tar –xvzf DBD-DB2-0.78.tar.gz`
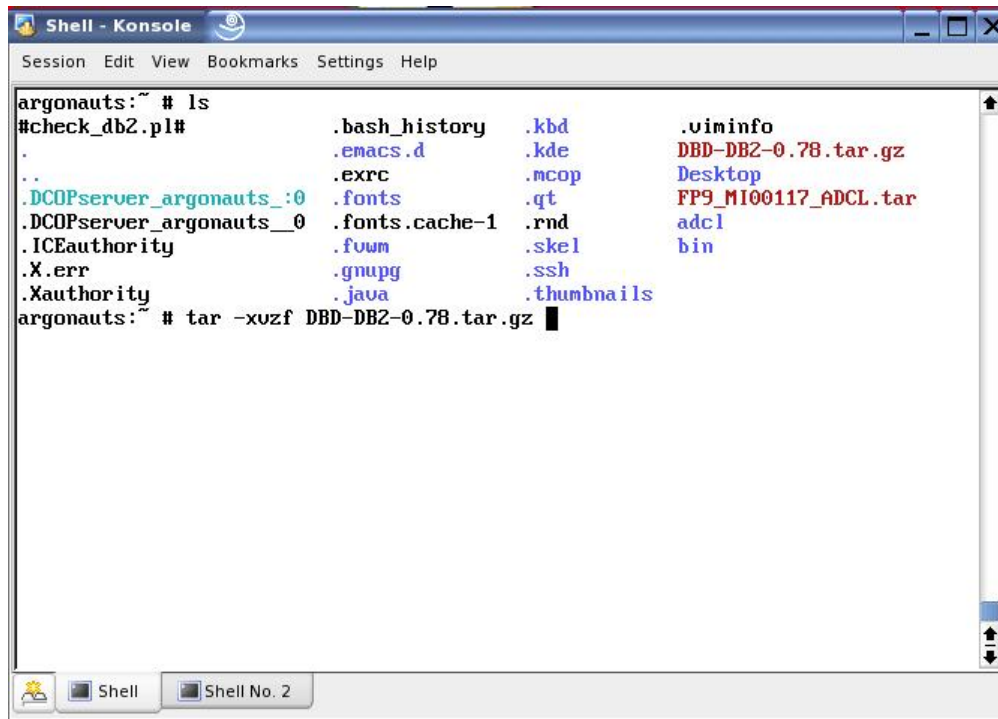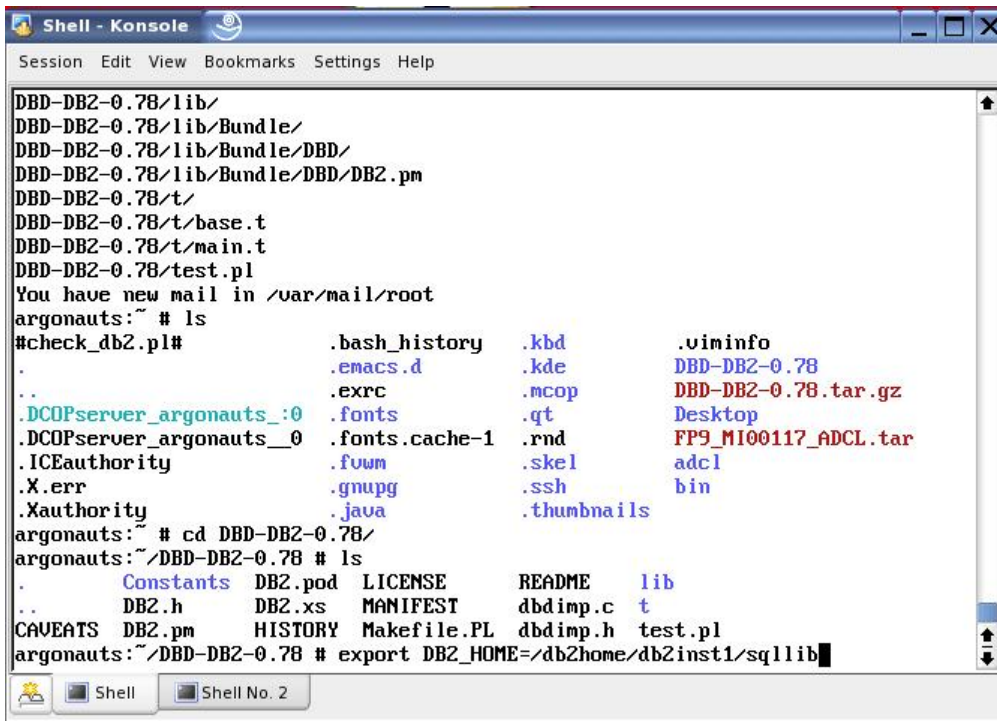
3. Change directory to the directory that now contains the DBI source using `cd DBD-DB2-0.78/`
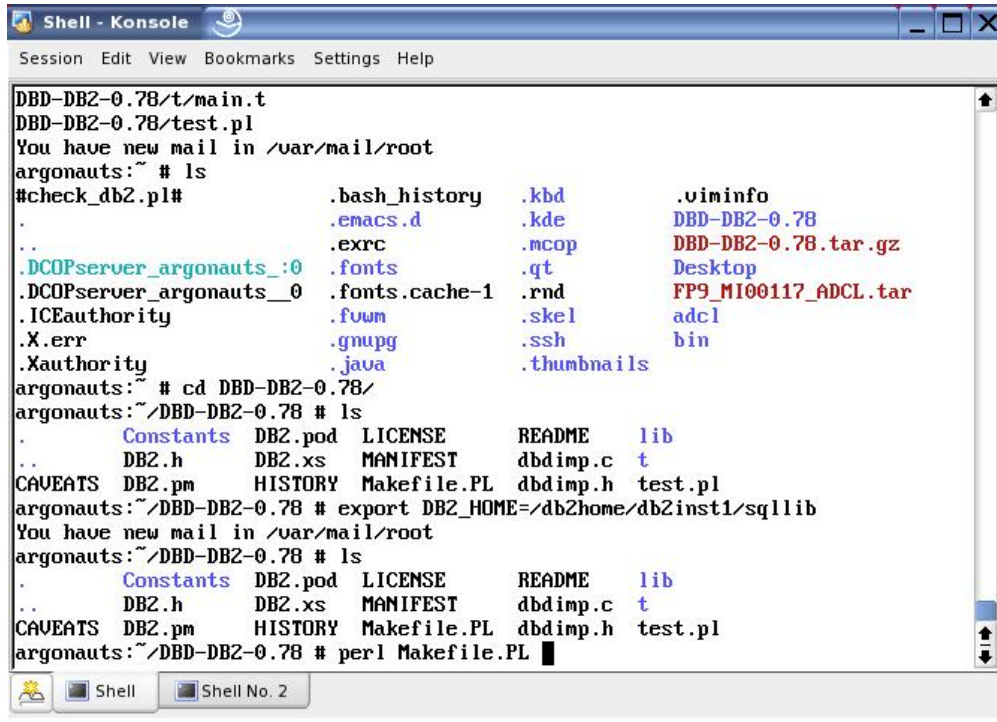
4. Run the command `export DB2_HOME=/<DB2 home directory>/<instance user>/sqllib` (Compiling and installing the DBI will not work without this variable set.)

5. Run `perl Makefile.PL` to create the makefile for the DBI.

6.   Run `make` to compile the DBI.

7.   Run `make test` to make sure that everything compiled properly.

8. Finally, run `make install` to install the DBI.

3.3 Installing the DB2 UDB plug-in

The DB2 UDB plug-in for Nagios monitors any databases cataloged on the local machine, but it needs to be installed in order to do so. The way the plug-in collects data about the databases is

computationally expensive. The plug-in does not run automatically the way most of the Nagios plug-ins do. Instead, it is up to the user to manually click the Web browser's **Refresh** button to refresh the page when accessing the plug-in through the Nagios Web interface. Installing the plug-in is quite simple since it mostly consists of copying files and then setting permissions on them.

1. Un-tar the check_db2 tar file using `tar -xvf check_db2-<version>.tar`
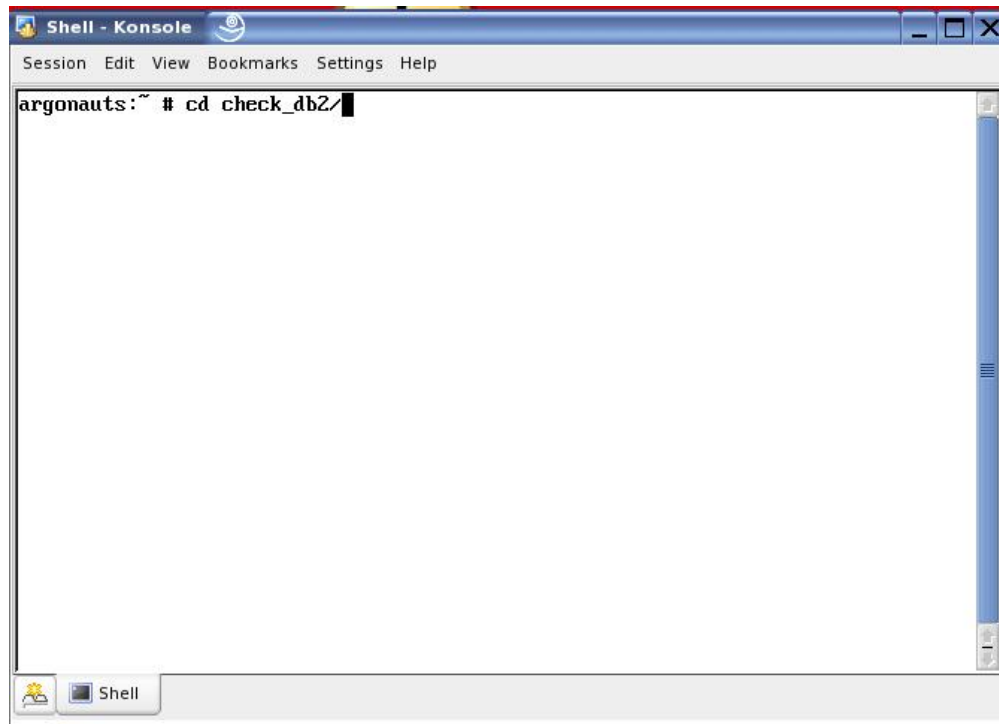
```
Shell - Konsole

Session  Edit  View  Bookmarks  Settings  Help

backup002.zip    backup009.zip   check_db2snapshot.pl~
backup003.zip    check_db2       db2.css
argonauts:/mnt/hgfs/shared # tar -cvf check_db2.tar check_db2
check_db2/
check_db2/check_db2.cgi
check_db2/check_db2.pl
check_db2/check_db2db.cgi
check_db2/check_db2db.pl
check_db2/check_db2snapshot.cgi
check_db2/check_db2snapshot.pl
check_db2/db2.css
check_db2/DB2_green_sm2.png
argonauts:/mnt/hgfs/shared # cp check_db2.tar /root
argonauts:/mnt/hgfs/shared # cd /root
argonauts:~ # ls
#check_db2.pl#           .bash_history   .kbd         .viminfo
.                        .emacs.d        .kde         DBD-DB2-0.78
..                       .exrc           .mcop        DBD-DB2-0.78.tar.gz
.DCOPserver_argonauts_:0 .fonts          .qt          Desktop
.DCOPserver_argonauts__0 .fonts.cache-1  .rnd         FP9_MI00117_ADCL.tar
.ICEauthority            .fvwm           .skel        adcl
.X.err                   .gnupg          .ssh         bin
.Xauthority              .java           .thumbnails  check_db2.tar
argonauts:~ # tar -xvf check_db2.tar █

  Shell      Shell No. 2
```
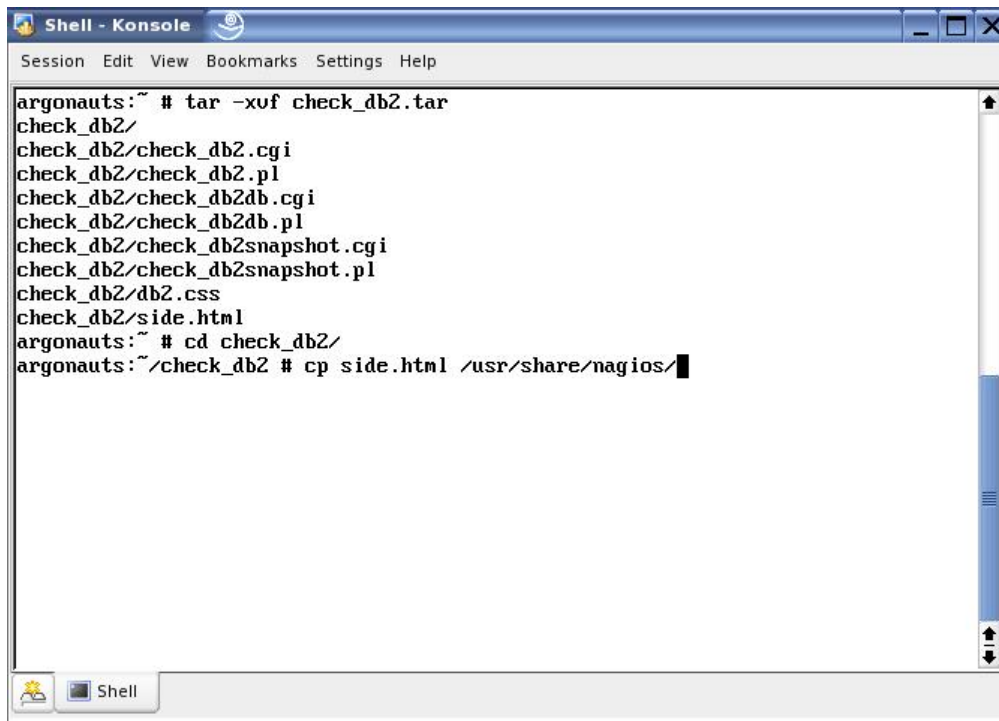
2. Change directory into the check_db2 directory with `cd check_db2-<version>/`

```
Shell - Konsole
Session  Edit  View  Bookmarks  Settings  Help
argonauts:~ # cd check_db2/
```
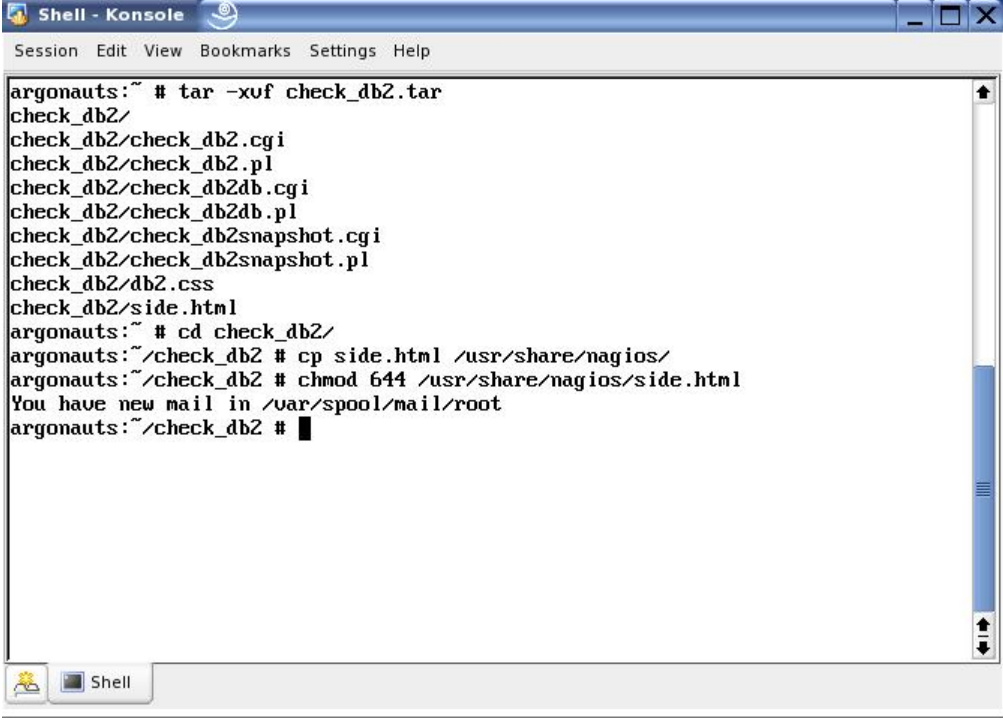
3. Copy the updated side.html file with `cp side.html /usr/share/nagios/` (If the current side.html has already been modified, the HTML that pertains to the DB2 UDB plug-in will need to be copied to the current file.)

```
Shell - Konsole
Session  Edit  View  Bookmarks  Settings  Help
argonauts:~ # tar -xvf check_db2.tar
check_db2/
check_db2/check_db2.cgi
check_db2/check_db2.pl
check_db2/check_db2db.cgi
check_db2/check_db2db.pl
check_db2/check_db2snapshot.cgi
check_db2/check_db2snapshot.pl
check_db2/db2.css
check_db2/side.html
argonauts:~ # cd check_db2/
argonauts:~/check_db2 # cp side.html /usr/share/nagios/
```

4. Run `chmod 644 /usr/share/nagios/side.html` to give it the appropriate permissions for its purpose.
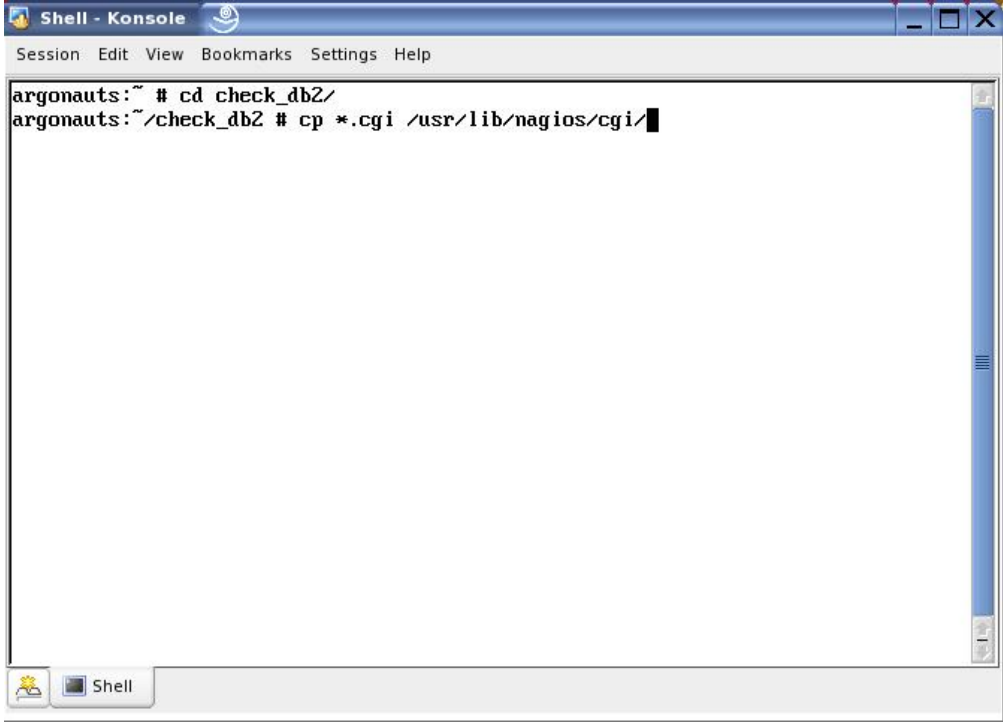
```
Shell - Konsole

Session  Edit  View  Bookmarks  Settings  Help

argonauts:~ # tar -xvf check_db2.tar
check_db2/
check_db2/check_db2.cgi
check_db2/check_db2.pl
check_db2/check_db2db.cgi
check_db2/check_db2db.pl
check_db2/check_db2snapshot.cgi
check_db2/check_db2snapshot.pl
check_db2/db2.css
check_db2/side.html
argonauts:~ # cd check_db2/
argonauts:~/check_db2 # cp side.html /usr/share/nagios/
argonauts:~/check_db2 # chmod 644 /usr/share/nagios/side.html
You have new mail in /var/spool/mail/root
argonauts:~/check_db2 # █

   Shell
```

5. Copy all the cgi scripts to /usr/lib/nagios/cgi/ with `cp *.cgi /usr/lib/nagios/cgi/`
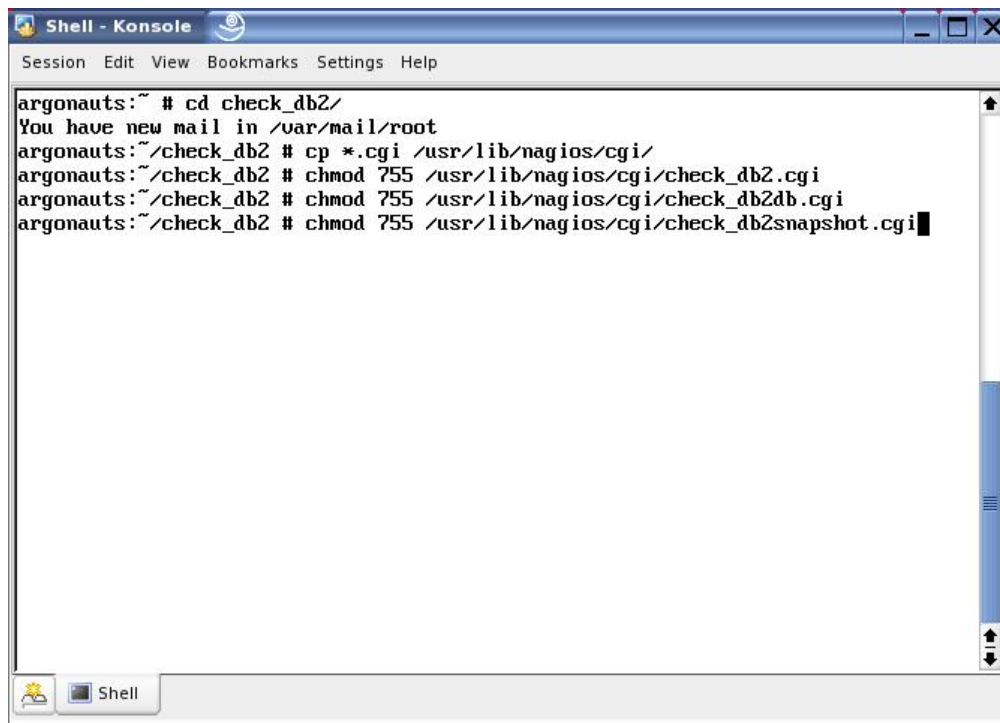
```
Shell - Konsole

Session  Edit  View  Bookmarks  Settings  Help

argonauts:~ # cd check_db2/
argonauts:~/check_db2 # cp *.cgi /usr/lib/nagios/cgi/█

   Shell
```

6. Run `chmod 755` on each of the scripts to allow them to be run through the Web interface.
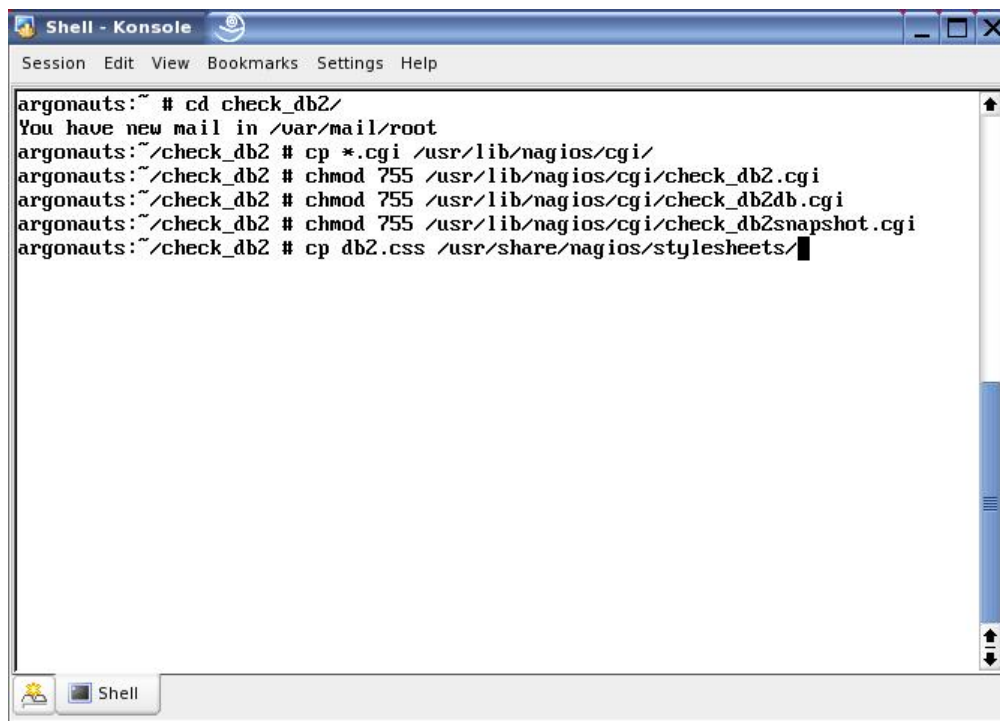
Installing the DB2 UDB Plug-in for Nagios

7. Copy db2.css to the Nagios stylesheets directory with `cp db2.css /usr/share/nagios/stylesheets/`

8. Run `chmod 664 /usr/share/nagios/stylesheets/db2.css` to make db2.css accessible to the scripts when they are run.

```
Shell - Konsole

Session  Edit  View  Bookmarks  Settings  Help

argonauts:~/check_db2 # chmod 664 /usr/share/nagios/stylesheets/db2.css
argonauts:~/check_db2 #
```

Shell

9. Open up check_db2.cgi for editing.
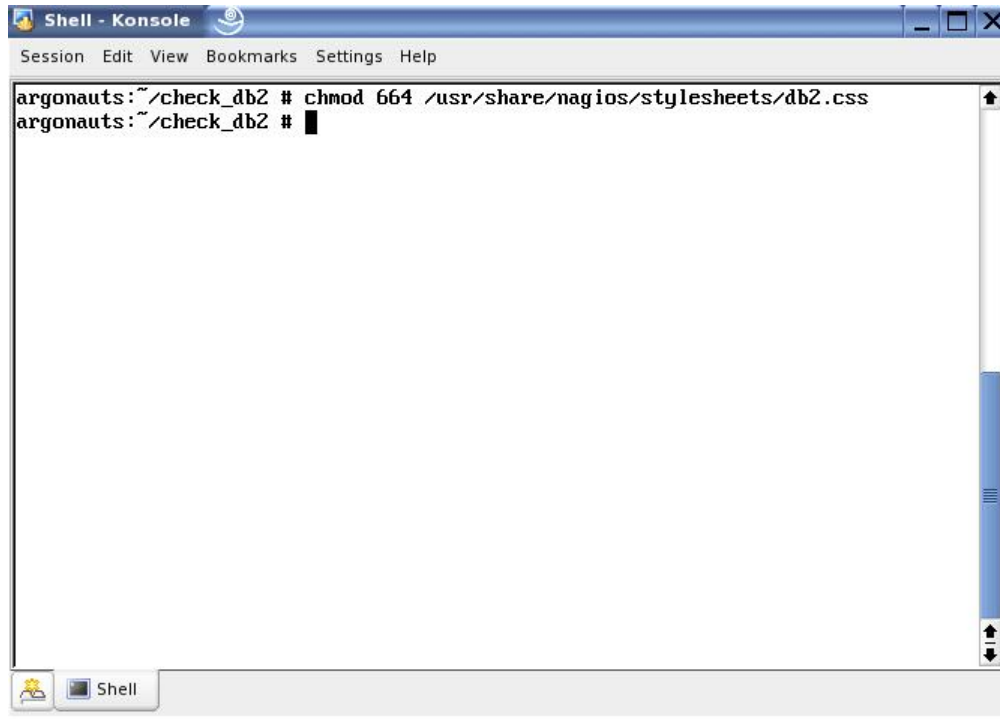
```
Shell - Konsole

Session  Edit  View  Bookmarks  Settings  Help

argonauts:~ # cd check_db2/
You have new mail in /var/mail/root
argonauts:~/check_db2 # cp *.cgi /usr/lib/nagios/cgi/
argonauts:~/check_db2 # chmod 755 /usr/lib/nagios/cgi/check_db2.cgi
argonauts:~/check_db2 # chmod 755 /usr/lib/nagios/cgi/check_db2db.cgi
argonauts:~/check_db2 # chmod 755 /usr/lib/nagios/cgi/check_db2snapshot.cgi
argonauts:~/check_db2 # cp db2.css /usr/share/nagios/stylesheets/
You have new mail in /var/mail/root
argonauts:~/check_db2 # chmod 755 /usr/share/nagios/stylesheets/db2.css
argonauts:~/check_db2 # vi /usr/lib/nagios/cgi/check_db2.cgi
```

Shell

10. Find the block of code where the $ENV{…} variables are set.

11. Change $ENV{'DB2INSTANCE'} to match the instance user's name on the local machine.

12. Change $ENV{'INSTHOME'} to match the instance user's home directory on the local machine.
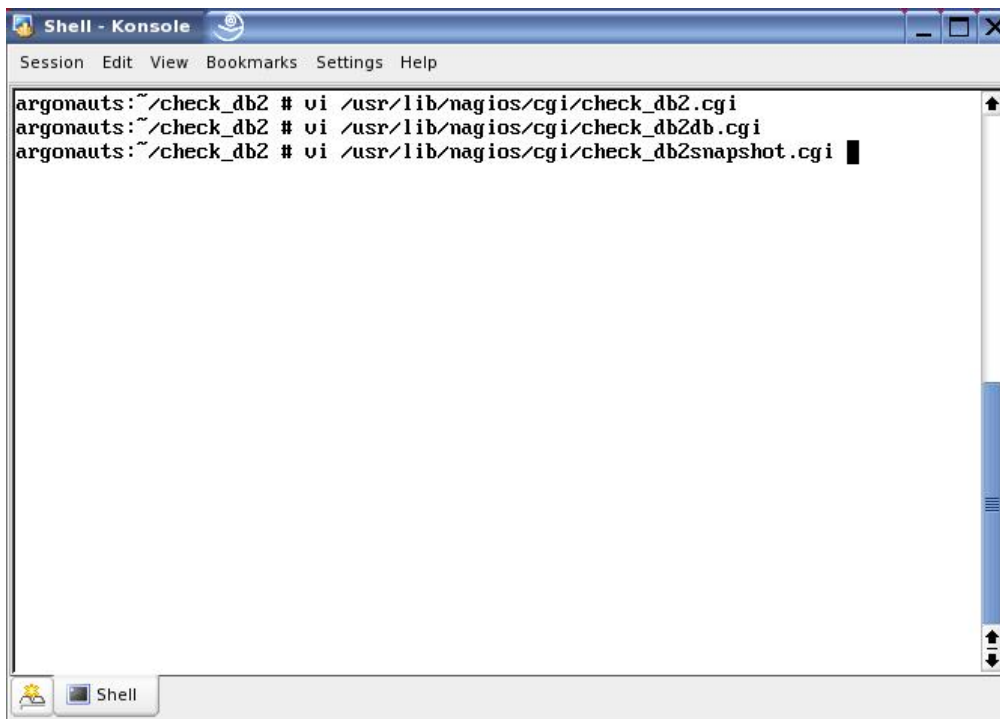
```
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│ 🔲 Shell - Konsole   ◉                                      _ □ ✕         │
├─────────────────────────────────────────────────────────────────────────┤
│ Session  Edit  View  Bookmarks  Settings  Help                            │
├─────────────────────────────────────────────────────────────────────────┤
│                    $found = 1;                                            │
│         }                                                                 │
│ }                                                                         │
│ # Bail if we don't have the DB2 driver                                    │
│ die "DB2 DBI not found.\n" unless $found;                                 │
│                                                                           │
│ # Now we need to set the environmental variables so that the DBI can connect│
│ $ENV{'DB2DIR'} = "/opt/IBM/db2/V8.1";                                     │
│ $ENV{'DB2INSTANCE'} = "db2inst1";                                         │
│ $ENV{'INSTHOME'} = "/db2home/db2inst1";                                   │
│ $ENV{'PATH'} .= ":".$ENV{'INSTHOME'}."/sqllib/bin a";                     │
│ $ENV{'PATH'} .= ":".$ENV{'INSTHOME'}."/sqllib/adm a";                     │
│ $ENV{'PATH'} .= ":".$ENV{'INSTHOME'}."/sqllib/misc a";                    │
│ $ENV{'LD_LIBRARY_PATH'} .= ":".$ENV{'INSTHOME'}."/sqllib/lib a";          │
│ $ENV{'LIBPATH'} .= ":".$ENV{'INSTHOME'}."/sqllib/lib a";                  │
│                                                                           │
│ # The username/password is stored temporarily in a cookie to speed things up a b│
│ it                                                                        │
│ my $query = new CGI;                                                      │
│ # Check to see if there's a cookie to speed things up or not             │
│ set_cookie() unless check_cookie();                                      │
│ # Get the existing cookie                                                │
│ my $cookie = $query->cookie( -name => "db2" );                           │
│ "/usr/lib/nagios/cgi/check_db2.cgi" 484L, 14325C        42,21      6%     │
├─────────────────────────────────────────────────────────────────────────┤
│ 🔳 🔲 Shell                                                               │
└─────────────────────────────────────────────────────────────────────────┘
```

13. Repeat the previous four steps for /usr/lib/nagios/cgi/check_db2db.cgi and /usr/lib/nagios/cgi/check_db2snapshot.cgi.

```
┌─────────────────────────────────────────────────────────────────────────┐
│ 🔲 Shell - Konsole   ◉                                      _ □ ✕         │
├─────────────────────────────────────────────────────────────────────────┤
│ Session  Edit  View  Bookmarks  Settings  Help                            │
├─────────────────────────────────────────────────────────────────────────┤
│ argonauts:~/check_db2 # vi /usr/lib/nagios/cgi/check_db2.cgi          ▲    │
│ argonauts:~/check_db2 # vi /usr/lib/nagios/cgi/check_db2db.cgi             │
│ argonauts:~/check_db2 # vi /usr/lib/nagios/cgi/check_db2snapshot.cgi █     │
│                                                                           │
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│ 🔳 🔲 Shell                                                               │
└─────────────────────────────────────────────────────────────────────────┘
```
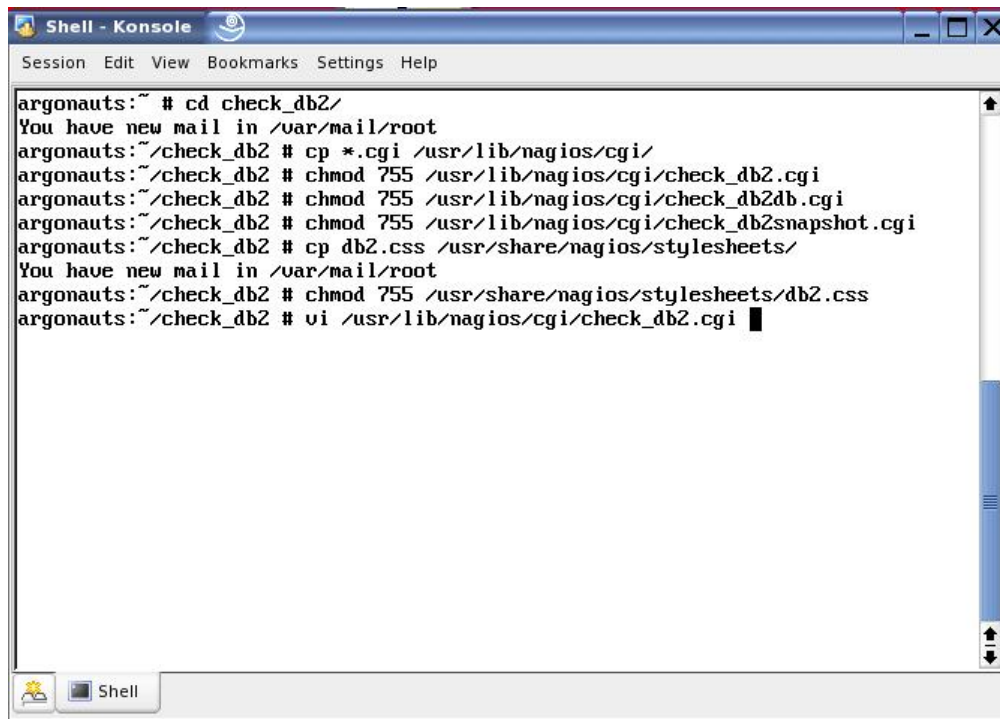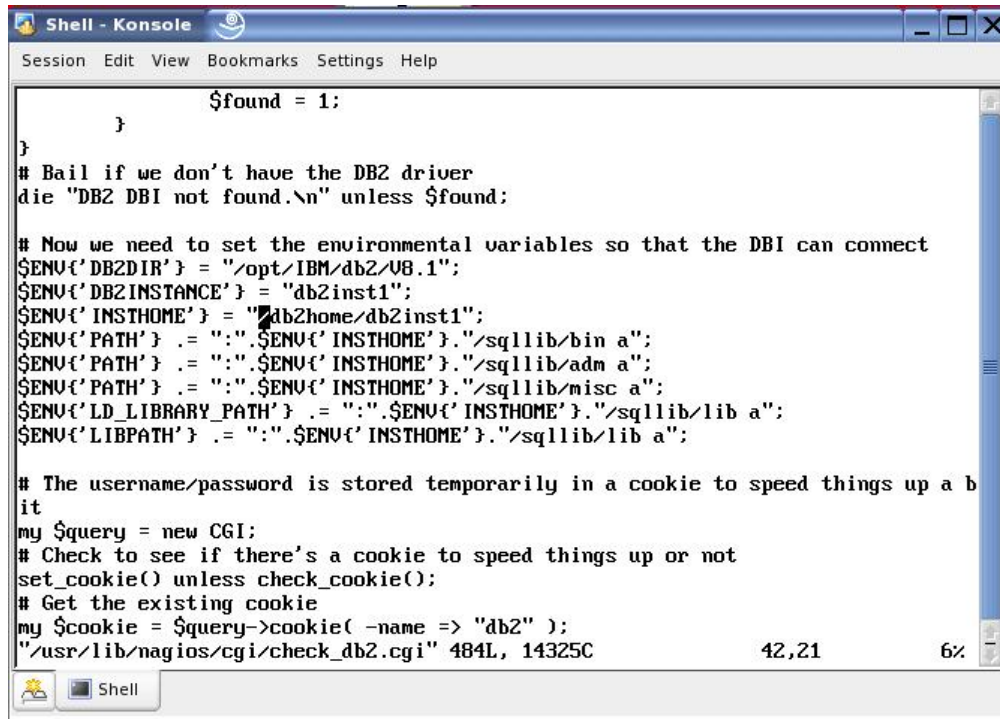
14. The plug-in is now installed.

3.4 Final Notes

Before attempting to use the plug-in, make sure that Apache, Nagios, and DB2 UDB are all running. The run status of Apache and Nagios can be checked with chkconfig. The run status of DB2 UDB can also be checked with the command `db2start` which will start DB2 if it is not running and return the current status otherwise. The plug-in requires all three of the above software packages in order to function.
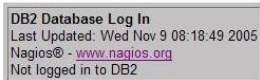
4. Introduction to the Plug-in

The DB2 UDB plug-in for Nagios provides a simple HTML GUI through Nagios' Web interface for a database or system administrator to monitor the DB2 UDB databases cataloged on a particular system. The plug-in has four main parts: the login screen, the general overview screen, the database overview screen, and the database snapshot screen. The plug-in is meant to be run through the Web interface, and will not work from the command line.

4.1 The Login Screen

The login screen is the first thing the user sees upon clicking the **DB2** link in the Nagios sidebar. This part of the interface is self-explanatory: with **Username** and **Password** fields and the **Login** button to log the user in. Please note that the username and password must be for a user associated with a DB2 UDB database, such as db2inst1, in order to log in. In the top left corner is the time at which this page was last refreshed, as well as a message that the user has not logged in to the plug-in yet. If the login is unsuccessful, the user will be notified.

4.2 The General Overview Screen

The general overview screen is the next screen that the user will see, assuming that the login was successful. (If the log in was unsuccessful, the user will be returned to the login screen with a message that the attempt failed.) The general overview screen gives the user a brief summary of information about each database currently cataloged on the local machine. Certain columns of data are also colour-coded to show the severity of the alert. Green is used when everything is fine and red is used when there is an extremely serious problem. Yellow and orange are used to represent warning levels more serious than green but less serious than red, with orange representing a more serious level than yellow. Columns that are grey either have a neutral status (i.e., no data is currently available) or the data is not colour-coded at all, and uses grey as the default. As with the previous screen, the last time of refresh can be found in the upper left corner, along with the username of the currently logged in user..

Installing the DB2 UDB Plug-in for Nagios

DB2 Database Overview
Last Updated: Wed Nov 9 10:49:12 2005
Nagios® - www.nagios.org
Logged in to DB2 as *db2inst1*

DB2 Database Overview For All Databases

Database	Status	Size (Current Partition)	Capacity (Current Partition)	Usage	Health	Last Backup
SAMPLE	Up	24 MB	5344 MB	0.447 %	Not yet evaluated	Never

4.3 The Database Overview Screen

The database overview screen can be accessed by clicking the database's name on the general overview screen. The database overview only shows information about a single database, but gives a more detailed summary about the selected database than the previous screen does. This screen also has a menu for the user to choose what kind of snapshot information about the database to be shown. The plug-in currently supports a number of different snapshots, each of which will return very detailed information about the database. Like the previous screen, the database overview also has some data that is colour-coded, using the same system to ensure consistency.

SAMPLE Database Overview
Last Updated: Wed Nov 9 11:57:50 2005
Nagios® - www.nagios.org
Logged in to DB2 as *db2inst1*

Get Agent Snapshot
Get Application Snapshot
Get Application Info Snapshot
Get Buffer Pool Snapshot
Get Container Snapshot
Get Database Snapshot
Get Lock Snapshot
Get Lock Wait Snapshot
Get Table Snapshot
Get Table Reorganization Snapshot
Get Tablespace Snapshot
Get Tablespace Configuration Snapshot

Database Overview For The SAMPLE Database

Item	Details	Actions
Agents	1 agents currently associated	More Info
Applications	1 applications currently connected	More Info
Health	Not yet evaluated	More Info
Current Locks	3 locks held	More Info
Current Lock Waits	0 lock waits	More Info
Tables	260 tables	More Info
Total Log Usage	0.000 % used	More Info

4.4 The Database Snapshot Screen

The database snapshot screen can be accessed by clicking one of the **Get XXXXX Snapshot** links on the database overview screen. This screen shows much more detailed information about a particular aspect of the database, as reported by the database itself. The data shown varies from snapshot to snapshot, as well as the data items that are colour-coded. A typical database snapshot is shown below. This is different from what a table space snapshot looks like, which, in turn, is different from what a health snapshot looks like. The data in each snapshot is accompanied by a label explaining what the data represents.

SAMPLE Database
Last Updated: Wed Nov 9 12:05:46 2005
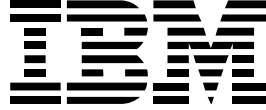Nagios® - www.nagios.org
Logged in to DB2 as *db2inst1*

Database Overview
Get Agent Snapshot
Get Application Snapshot
Get Application Info Snapshot
Get Buffer Pool Snapshot
Get Container Snapshot
Get Database Snapshot
Get Lock Snapshot
Get Lock Wait Snapshot
Get Table Snapshot
Get Table Reorganization Snapshot
Get Tablespace Snapshot
Get Tablespace Configuration Snapshot

Database Snapshot For The SAMPLE Database

Item	Details
Timestamp	2005-11-09 12:05:54.728437
Maximum Secondary Log Space Used	0
Maximum Total Log Space Used	0
Total Log Space Used	0
Total Log Space Available	20400000
Rows Read	15
Buffer Pool Data Logical Reads	0
Buffer Pool Data Physical Reads	0
Buffer Pool Data Writes	0
Buffer Pool Index Logical Reads	0
Buffer Pool Index Physical Reads	0
Buffer Pool Index Writes	0
Buffer Pool Read Time	0
Buffer Pool Write Time	0
Asynchronous Pool Index Page Reads	0
Data Pages Copied To Extended Storage	0
Index Pages Copied To Extended Storage	0
Index Pages Copie From Extended Storage	0
Data Pages Copied From Extended Storage	0
Asynchronous Pool Data Page Reads	0
Asynchronous Pool Data Page Writes	0
Asynchronous Pool Index Page Writes	0
Total Elapsed Asynchronous Read Time	0
Total Elapsed Asynchronous Write Time	0

5. Conclusion

This paper described the DB2 UDB plug-in for the Nagios open source system monitor. This solution provides a simple interface through Nagios to monitor the status of any DB2 UDB database currently cataloged on the local system. The Nagios system monitor provides the basic Web interface and system monitoring capabilities, and then the DB2 plug-in interfaces with the DB2 UDB databases to provide the desired information on the databases.

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