

**MALAYSIAN PUBLIC SECTOR
OPEN SOURCE SOFTWARE (OSS) PROGRAMME**

**BENCHMARK / EVALUATION REPORT ON
DESKTOP MANAGER
GNOME VS KDE**

JUNE 2010



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SECTION 1 : INTRODUCTION

EXECUTIVE SUMMARY

Desktop Manager, referred to as graphical user interface or GUI, is designed to assist the user in easily accessing and configuring specific operating system features. A desktop environment typically consists of icons, windows, toolbars, folders, wallpapers, shortcuts and desktop widgets. The desktop environment is more flexible on X Window System . It consists of window manager (Metacity or Kwin), a file manager (Nautilus or Dolphin), a set of themes and libraries for managing the desktop. There are a number of desktop managers available in Linux but the most dominant solutions are GNOME and KDE.

For the purpose of benchmarking, we have chosen GNOME and KDE on three different distros, i.e. Ubuntu, CentOS and OpenSUSE, to compare the general features and to evaluate the desktop's performance. The desktop-oriented evaluations performed on the selected desktop managers were performed using Stresos which is an application written in Java. This benchmark application is meant to test a desktop manager on different operating systems.

INTRODUCTION

GNOME (**G**NU **N**etwork **O**bject **M**odel **E**nvironment) is a desktop environment that runs on top of various Unix-like operating systems, most notably GNU/Linux. The initial release was on 3rd March 1999 and the current stable release 2.30 was released on 23rd April 2010. GNOME is the default desktop environment for several Linux distributions, most notably Debian, Fedora and Ubuntu, as well as for OpenSolaris.

KDE (**K** Desktop **E**nvironment) is also a desktop environment designed to run on Linux, FreeBSD, Windows, Solaris and Mac OS X systems. It is best known for its Plasma Desktop workspace. KDE is the default working environment on many Linux distributions, such as openSUSE, Mandriva Linux and Kubuntu.

GNOME and KDE are very mature and advanced desktop managers and of course both will have their own pros and cons. To compare and evaluate the general features and system performances of these 2 desktop managers, an evaluation was conducted by Research and Development unit of OSCC MAMPU.

SECTION 2 : EVALUATION METHODS

HARDWARE SPECIFICATIONS

The evaluation of GNOME and KDE was conducted on the same hardware specifications as listed below:

- Processor : Pentium Dual Core CPU E5300 @ 1.80GHz
- Motherboard : Gigabyte G31M-ES2L
- Architecture : x86
- Chipset : Intel 82G33/G31/P35/P31 + ICH7
- Memory : 4GB RAM
- HDD : 160GB WDC
- Graphics : Intel 82G33/G31 Express IGP 256MB

COMPARISON & EVALUATION METHODS

Two (2) machines with the same hardware specifications were used for comparison and evaluation purposes. GNOME and KDE were tested on the platforms below :

GNOME	KDE
Ubuntu 10.04	Kubuntu 10.04 (KDE version of Ubuntu)
CentOS 5.5	CentOS 5.5
OpenSUSE 11.2	OpenSUSE 11.2

Table 1 : Benchmarking Platforms

The benchmarking was done separately on Ubuntu and Kubuntu, CentOS GNOME and CentOS KDE and finally OpenSUSE GNOME and OpenSUSE KDE.

Once the installation for each platform was done, the packages and general features of both desktop managers were compared and the results presented in table form in the next section.

Apart from the manual comparison, a Java-based application, Stresos was used for the benchmarking purpose. This application tests the fit of the system on respective desktop managers. As a prerequisite, Java Runtime Environment is required to run the application. The test was performed 3 times on each platform to get an average score. Each time a test was conducted, 5 different criteria were used as follows :

- Criterion 1 - Writes – writes data into a file
- Criterion 2 - Reads – reads the file created by writes test
- Criterion 3 - Copy – copies data between files
- Criterion 4 - Computation – performs computations
- Criterion 5 - UI – creates windows and then destroys them

Each test is scored. At the end of the benchmarking, weighted mean of all the scores was computed by the application itself using the following formula :

$$\text{Score}_{\text{final}} = \frac{(\text{Score}_{\text{write}} * 1) + (\text{Score}_{\text{read}} * 1) + (\text{Score}_{\text{copy}} * 1) + (\text{Score}_{\text{computation}} * 1) + (\text{Score}_{\text{ui}} * 6)}{1 + 1 + 1 + 1 + 6}$$

The UI test was weighted as most important (6) as these days most desktop environments are GUIs (windows based).

SECTION 3 : DISCUSSION OF RESULTS

COMPARISON

GNOME and KDE general comparison table

	GNOME	KDE
General Features	Creating an attractive desktop environment	
Application Framework	GTK+	QT
X window manager	Metacity	KWin
X display manager	GDM	KDM
File manager	Nautilus	Dolphin
Terminal emulator	Terminal	Konsole
Text editor	Kate	Gedit
Video Player	Totem	Kaffeine
Audio player	Rythmbox	Amarok
CD burners	Brasero	K3B
PDF viewer	Evince	Okular
Web browser	Epiphany	Konqueror
E-mail client	Kmail	Evolution
Graphical Package Manager	Synaptic Manager	KPackage

Table 2 : Desktop Manager Comparison Table

EVALUATION TEST RESULT

All the test results are presented according to distros.

1. Platform : Ubuntu (GNOME) vs Kubuntu (KDE)

	Ubuntu (GNOME)	Kubuntu (KDE)
Test 1		
Test 2		
Test 3		
Average	322 ms	736 ms

Table 3 : Test results for Ubuntu vs Kubuntu

2. Platform : CentOS (GNOME) vs CentOS (KDE)

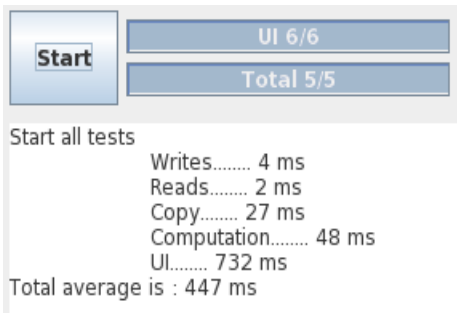
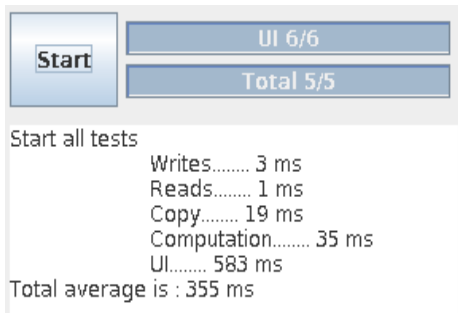
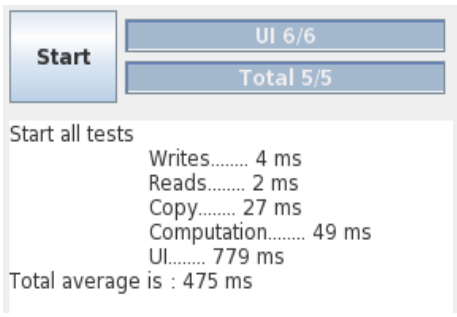
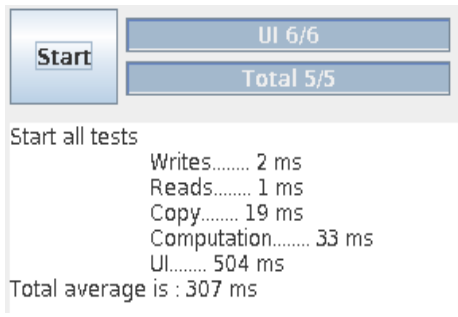
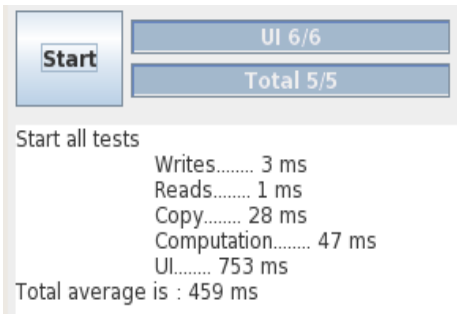
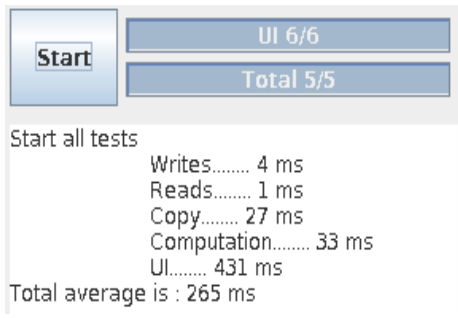
	CentOS (GNOME)	CentOS (KDE)
Test 1	 <p>Start all tests Writes..... 4 ms Reads..... 2 ms Copy..... 27 ms Computation..... 48 ms UI..... 732 ms Total average is : 447 ms</p>	 <p>Start all tests Writes..... 3 ms Reads..... 1 ms Copy..... 19 ms Computation..... 35 ms UI..... 583 ms Total average is : 355 ms</p>
Test 2	 <p>Start all tests Writes..... 4 ms Reads..... 2 ms Copy..... 27 ms Computation..... 49 ms UI..... 779 ms Total average is : 475 ms</p>	 <p>Start all tests Writes..... 2 ms Reads..... 1 ms Copy..... 19 ms Computation..... 33 ms UI..... 504 ms Total average is : 307 ms</p>
Test 3	 <p>Start all tests Writes..... 3 ms Reads..... 1 ms Copy..... 28 ms Computation..... 47 ms UI..... 753 ms Total average is : 459 ms</p>	 <p>Start all tests Writes..... 4 ms Reads..... 1 ms Copy..... 27 ms Computation..... 33 ms UI..... 431 ms Total average is : 265 ms</p>
Average	460 ms	309 ms

Table 4 : Test Results for CentOS (GNOME) vs CentOS (KDE)

3. Platform : OpenSUSE (GNOME) vs OpenSUSE (KDE)

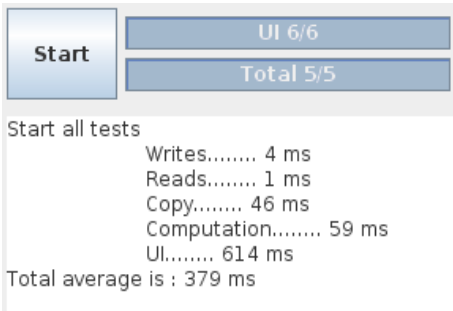
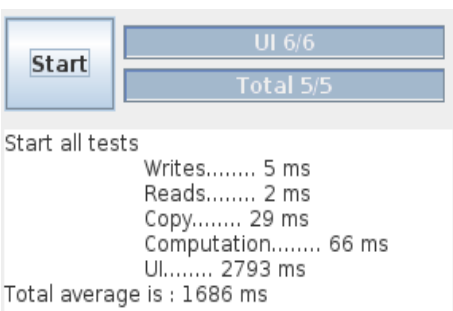
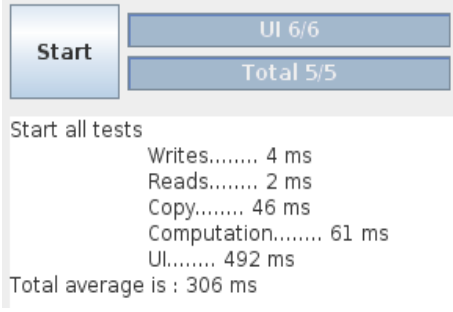
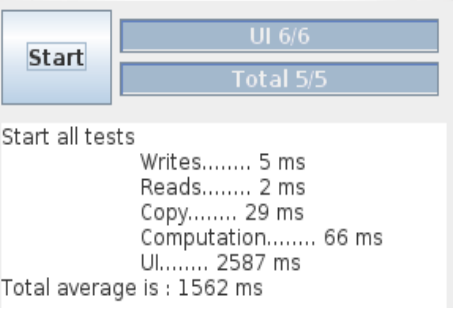
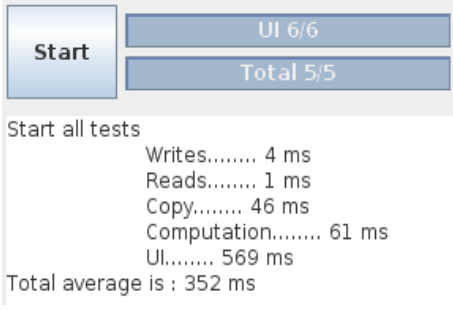
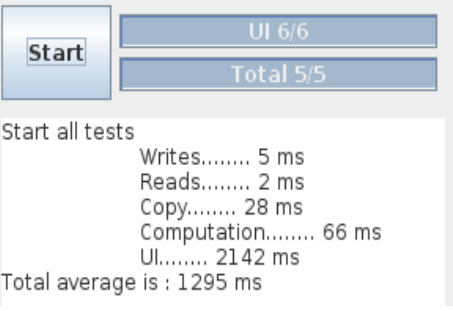
	OpenSUSE (GNOME)	OpenSUSE (KDE)
Test 1	 <p>Start all tests Writes..... 4 ms Reads..... 1 ms Copy..... 46 ms Computation..... 59 ms UI..... 614 ms Total average is : 379 ms</p>	 <p>Start all tests Writes..... 5 ms Reads..... 2 ms Copy..... 29 ms Computation..... 66 ms UI..... 2793 ms Total average is : 1686 ms</p>
Test 2	 <p>Start all tests Writes..... 4 ms Reads..... 2 ms Copy..... 46 ms Computation..... 61 ms UI..... 492 ms Total average is : 306 ms</p>	 <p>Start all tests Writes..... 5 ms Reads..... 2 ms Copy..... 29 ms Computation..... 66 ms UI..... 2587 ms Total average is : 1562 ms</p>
Test 3	 <p>Start all tests Writes..... 4 ms Reads..... 1 ms Copy..... 46 ms Computation..... 61 ms UI..... 569 ms Total average is : 352 ms</p>	 <p>Start all tests Writes..... 5 ms Reads..... 2 ms Copy..... 28 ms Computation..... 66 ms UI..... 2142 ms Total average is : 1295 ms</p>
Average	346 ms	1514 ms

Table 5 : Test Results for OpenSUSE (GNOME) vs OpenSUSE (KDE)

Table 3, 4 and 5 show screen shots of the test results conducted using GNOME and KDE on selected distros. The total average time is taken upon completion of writing, reading, copying, computational operations and UI (user interface) creation.

According to table 3, Ubuntu and Kubuntu take an average of 322ms and 736ms respectively to perform all the test operations. Most of the results are minor in differences. The only major difference is in the UI creation test where Kubuntu takes more than twice as long as Ubuntu.

In table 4, the overall difference is marginal with the total difference of 151ms, where UI tests in Centos (GNOME) consistently takes longer to complete than in Centos (KDE).

In table 5, there is a major difference in the total average where OpenSUSE (KDE) is significantly slower than OpenSUSE (GNOME) with 1168ms. The difference is caused by UI creation as KDE requires more time to complete this function.

4. Memory Consumption Readings

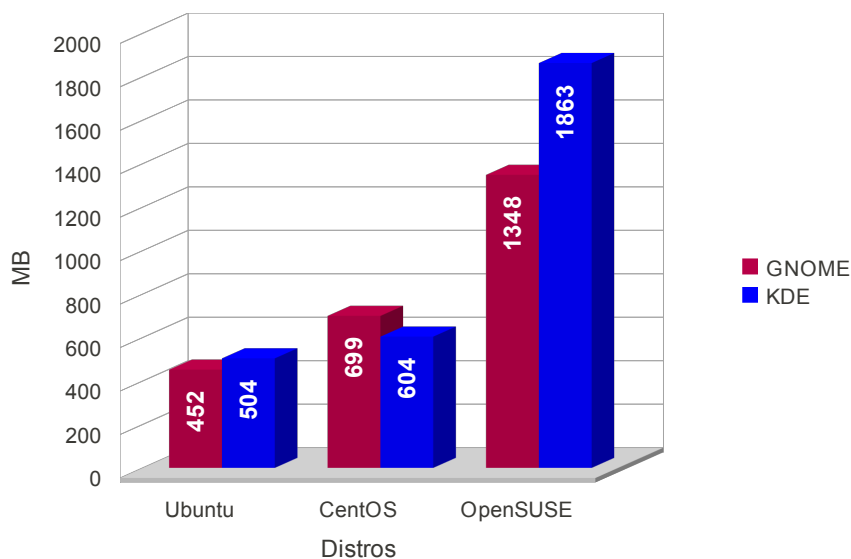


Chart 1 : Memory Consumption Readings

Chart 1 shows memory consumption readings in each distros. The total physical memory in each machine is 4GB and the common tool **free -l** is used to get the readings. The reading is taken once the machine is booted up and its known that each distros handling memory in its own way. Based on the above chart, GNOME consumes less memory compared to KDE in both Ubuntu and OpenSUSE as it opts for simplicity and often hides certain configurations in order to achieve that simplicity. KDE focuses on offering as many features as possible with graphical ways for configuring those features. Apart from that, KDE consumes more memory mainly on cosmetics, applets and extensive use of panels.

The memory readings in CentOS shows KDE consumes less memory compared to GNOME as it uses fairly basic interface with some nice configurations, but nothing fancy. Both desktop managers perform exceptionally well although KDE beats GNOME on CentOS by a significant amount.

CONCLUSIONS

Based on the test results, GNOME takes less total average time and less memory consumption on Ubuntu and OpenSUSE. On CentOS, KDE seems better than GNOME.

GNOME on Ubuntu and OpenSUSE looks more responsive and faster in loading applications, rendering screens, and dragging windows compared to KDE as it offers more cosmetics for better feel and look. In CentOS, the differences between GNOME and KDE are marginal.

KDE and GNOME have their own advantages. KDE is best for people who prefer eye-candy and rich features because it has features like shadows, window transparency, applets and 3D animation effects. But because of these extra features, it is bloated, and slower. GNOME, on the other hand, also has the eye-candy features but it seems more quicker and simpler and its most suitable for beginners.

Both GNOME and KDE can be customized to behave exactly the way we want. At the same time, GNOME applications can be used in KDE and vice versa.

SECTION 4 : REFERENCES

REFERENCES

Lists of references reviewed or consulted during the analysis.

- i. <http://www.gnome.org/>
- ii. <http://en.wikipedia.org/wiki/GNOME>
- iii. <http://www.kde.org/>
- iv. <http://en.wikipedia.org/wiki/KDE>
- v. <http://stresos.com/>