

## Hello NetKernel

Welcome. If you are reading this you've probably heard **NetKernel™** mentioned in some XML-related workshop, pretty much like I did back in 2006. Or maybe you have heard about **Resource Oriented Computing (ROC)™** and want to see a practical implementation. Or maybe ... Whatever your reasons for reading it, this book intends to take your hand show you the wonderful world of NetKernel<sup>1</sup>. Are you ready ?

### Audience

This book is intended for beginning and intermediate ROC-ers<sup>2</sup>. There is a learning curve to ROC and NetKernel and this book will help you along that curve.

### Conventions

The book was made with OpenOffice 3.2.1, all formats/fonts mentioned below are available in that editor.

The standard font for this book is **Verdana, 12pt, Black**

Chapter titles are **18pt, Turquoise 6**

Subtitels are **14pt, Turquoise 5**

Headings are **12pt, Bold, Black**

Operators (verbs indicating an action) in the text are underlined, followed by an operand (the thing acted upon) in italic.

Push *this*

Shake *that*

The font for operating system output in this book is **Courier New, 12pt**, instruction lines have a **Grey (10%)** background, the instructions themselves are put in **Bold**.

```
your_user@ubuntumachine:~$ aptitude -vvvv moo
```

```
Okay, okay, if I give you an Easter Egg, will you go away?
```

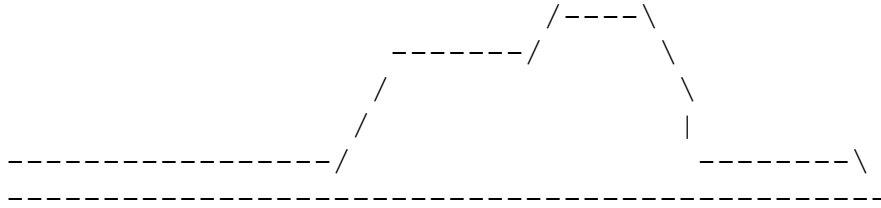
```
your_user@ubuntumachine:~$ aptitude -vvvvv moo
```

```
All right, you win.
```

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1 1060, NetKernel, Resource Oriented Computing, ROC are respectively registered trademark and trademarks of 1060 Research Limited

2 Puns with *ROC(ks)* are encouraged in all use of NetKernel. It does make asking for a drink with ice at a NetKernel convention a rather tricky thing to do though ...



```
your_user@ubuntumachine:~$ aptitude -vvvvvv moo  
What is it? It's an elephant being eaten by a snake, of  
course.
```

## Content

Chapter 1	<a href="#">Hello NetKernel</a> In what remains of this chapter I'll walk you through the NetKernel history, give you a 10000 feet overview of ROC and tell you just why you should bother with NetKernel and ROC.
Chapter 2	...
Chapter 3	...
Chapter 4	...
Chapter 5	...
Chapter 6	...

## Content (continued)

Appendix A	<a href="#">Getting and Installing NetKernel</a> In this appendix I show you how and where to download NetKernel and how to do a basic install. The appendix concludes with doing an Apposite update to make your installation current.
Appendix B	<a href="#">Setting up your own Apposite Repository</a> Some NetKernel instances will not have access to the internet. They will still require updates though. This appendix explains how to set up your own Apposite Repository.
Appendix C	<a href="#">Running NetKernel as a service / daemon started at boottime</a> A basic install is fine for a development workstation, but your production servers will require NetKernel to start at boottime. This appendix shows you how to accomplish that.
Appendix D	<a href="#">Locking down your NetKernel instance (Linux specific)</a> The internet is a wonderful place. Quite a bit jungle-like, now I think of it. In this appendix a couple of simple precautions will teach you how to avoid being eaten while still enjoying the wildlife (NetKernel).

## Don't know much about history ...

1060 Research was founded as a spin-out of original research (codenamed *dexter*) undertaken at Hewlett-Packard labs. The 1060 team created and implemented the **Resource Oriented Computing™** model in what you and I know as **NetKernel™**. In the mean time this technology is more than 10 years old and has proven itself in sectors ranging from Telecoms, Insurance, Banking and Military.



At the time of writing this book (September 2010) my source at Hewlett-Packard labs tells me that the current research – something that can be used to automate your garden management (amongst other things) – is codenamed *dharm*<sup>3</sup>. Now, aren't you glad you just found out that bit of information ? Personally I just wonder if they work alphabetically.



If you haven't lost your sense of humour by now, how is your knowledge of Roman numerals<sup>4</sup> ? Perfect ? Then try this :  
X + M + L = ?

## 10000 feet view of Resource Oriented Computing

If you want to a more complete (and correct) explanation than you'll get here, have a look at ***Introduction to Resource-Oriented Computing, part I***, an excellent document that you can find under the heading *Technical Whitepapers* on <http://www.1060research.com/netkernel/roc/>. Be warned though that it is a tough read and that intimate knowledge of both *Plato* and *Jack and the beanstalk* are required.

Let me tell you what I think ROC is (after working on and off with it for +/- 4 years) :

1. Everything is a resource. That includes your code, my code, data on the database on my workstation and data encrypted steganographically in an image of the National Art Gallery in Kuala Lumpur.
2. Once you grasped 1. (and that may take a while) let go of worrying about where and how those resources are implemented.

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3 <http://en.wikipedia.org/wiki/Dharma>

4 [http://en.wikipedia.org/wiki/Roman\\_numerals](http://en.wikipedia.org/wiki/Roman_numerals)

3. Instead, focus on what you want to do with the resources, doing that in small simple services that you can string together to as complex a system as you can imagine (and probably way beyond that).
4. Stand amazed at how your system scales in exactly the same way that the internet scales.

## Why bother ?

When I was in school (*Anno Domini Nostris Iesu*<sup>5</sup> 1992) training to become an IT Bachelor, we got an introduction session on the NeXTSTEP platform. The platform that was going to make us (IT professionals) obsolete within the next couple of years. And after the impressive session most of us (including myself) believed it.

18 years later I'm still in IT. People still use Cobol, PL1 and CICS (as they – well, obviously not the same people ... I hope – did before I was born). NeXTSTEP only survives in the Apple OS somewhere.

If you've been around in IT for a while, you'll have such a story of your own. There's always the **next** best thing that will take away all the pain of software development (the human factor mostly) completely. And managers will always love it.

But if one really has to say what technology **has worked** in the last 15 years, one would have to say ... the internet. It has grown beyond imagination.

**ROC**<sup>TM</sup> combines the core ideas of the internet, the core ideas of Unix<sup>6</sup> and REST<sup>7</sup> into a new and potent whole :

*From Unix* - borrow the idea of using simple tools that share a common interoperable data model (e.g., awk, grep, sed, etc.) to build solutions.

*From REST* - address everything (resources, services and code) with a URI to loosely couple the *internals* of your software making it as flexible as the Web.

**NetKernel**<sup>TM</sup> brings all this to an infrastructure near you !

*Don't take my word for it.* In retrospect I'd have liked to hear the guy showing us NeXTSTEP say that. In fact, our class did meet him again as a mime (doing a robot-impersonation) on some IT gathering later that same year. It turned out that he was out of a job only weeks after giving us the presentation.

As of [Chapter 2](#) each chapter will contain a bit of ROC-talk and a lot of hands-on NetKernel-stuff you **can** try at home. In fact, I'm counting on you to try it at home !

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5 In

6 <http://en.wikipedia.org/wiki/Unix>

7 [http://en.wikipedia.org/wiki/Representational\\_State\\_Transfer](http://en.wikipedia.org/wiki/Representational_State_Transfer)

## CHAPTER 2

<Title Chapter 2/>

<chapter 2 text/>

## Getting and Installing NetKernel

### Prerequisites

To run NetKernel you must have a computer and operating system capable of running Java 1.5 or 1.6. NetKernel is platform neutral and has been deployed successfully on Windows 2000, Windows 7, Windows XP, Windows Vista, Windows Server 2003, Apple Mac OS X, Linux (Redhat, Suse, Debian, Ubuntu) and Solaris.

The above comes straight from the install notes. I just want to add that although a JRE (java runtime environment) is sufficient to run NetKernel with all its features, I strongly advise you to install a JDK on machines where you do NetKernel development.

### Download

This book deals with the (open source) NetKernel Standard Edition and the versions for that can be found under <http://download.netkernel.org/nkse/> :

- Select the download for the 4.1.x. version.
- Pick a mirror.
- Save the *1060-NetKernel-4.1.x.jar* file to your system.
- While the download is running, read the *install notes*.

### Installation

Installation is very easy and pretty much identical on any platform. Below you'll find the transcripts of an installation on **Windows 7** and **Ubuntu 10.04 LTS - the Lucid Lynx**.

### Running the downloaded jar – Windows

First position yourself in the directory above the one where you want to install NetKernel (I'm going to install in D:\NK4, so I position in D:, I also put the downloaded jar there for ease of use).

```
C:\Users\your_user>d:
D:\>java -jar 1060-NetKernel-SE-4.1.1.jar
Expanding urn.com.ten60.core.boot-1.13.22
Expanding urn.com.ten60.core.cache.se-1.2.11
Expanding urn.com.ten60.core.layer0-1.31.57
Expanding urn.com.ten60.core.module.standard-1.20.29
Expanding urn.com.ten60.core.netkernel.api-4.1.5
Expanding urn.com.ten60.core.netkernel.impl-4.13.24
I 17:11:40 Kernel
Starting 1060-NetKernel-SE
...
```

```

I 17:11:45 Kernel          NetKernel Ready, accepting requests...
I 17:11:45 ModuleManager System now at RunLevel [2]
*****
* JAR BOOT NOTES
* -----
* NetKernel is now running an HTTP server on port 1060
*
* To start using NetKernel open a web browser
* and go to:  http://localhost:1060/
*****

```

## Running the downloaded jar - Ubuntu

Starting the downloaded jar on Linux is exactly the same as on Windows, but we are going to do a bit of preparation in advance, this will make things easier later on.

```

your_user@ubuntumachine:~$ sudo groupadd --gid 1060 dexter
your_user@ubuntumachine:~$ sudo useradd --uid 1060 --gid 1060 -m \
-d /home/dexter -s /bin/bash -c 'NetKernel software' dexter
your_user@ubuntumachine:~$ sudo passwd dexter
your_user@ubuntumachine:~$ sudo mkdir /usr/NK4
your_user@ubuntumachine:~$ sudo chown dexter:dexter /usr/NK4

```

You can of course pick your own groupname, username and directorynames, the rest of this installation procedure will go with the values used above.

Change to the newly created user, position yourself in the directory above the one where you want to install NetKernel and start the downloaded jar.

```

dexter@ubuntumachine:~$ cd /usr
dexter@ubuntumachine:/usr$ java -jar 1060-NetKernel-SE-4.1.1.jar
Expanding urn.com.ten60.core.boot-1.13.22
Expanding urn.com.ten60.core.cache.se-1.2.11
Expanding urn.com.ten60.core.layer0-1.31.57
Expanding urn.com.ten60.core.module.standard-1.20.29
Expanding urn.com.ten60.core.netkernel.api-4.1.5
Expanding urn.com.ten60.core.netkernel.impl-4.13.24
I 17:22:40 Kernel
Starting 1060-NetKernel-SE
...I 17:22:42 Kernel          NetKernel Ready, accepting requests...
I 17:22:42 ModuleManager System now at RunLevel [2]
*****
* JAR BOOT NOTES
* -----
* NetKernel is now running an HTTP server on port 1060
*
* To start using NetKernel open a web browser
* and go to:  http://localhost:1060/
*****

```



## Verification – all environments

If all is well, you can now :

- fire up your favorite webbrowser
- enter `http://localhost:1060`

And you should get this screen :



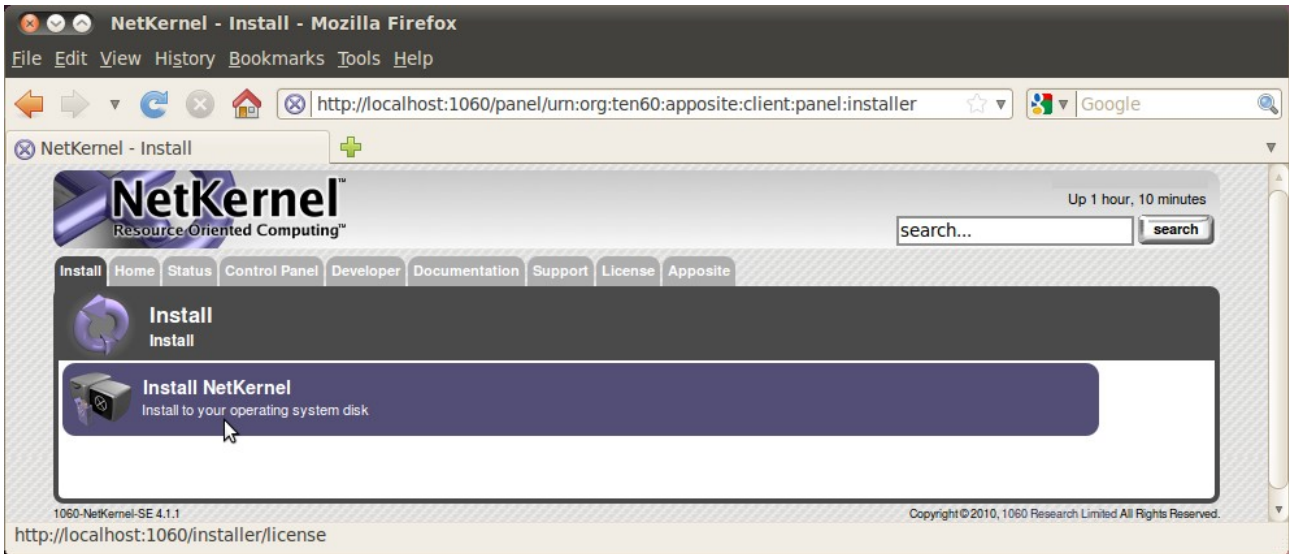
If your machine has internet access you will get news items underneath *NetKernel News*.



The NetKernel interface will perform well on any **modern up-to-date** webbrowser.

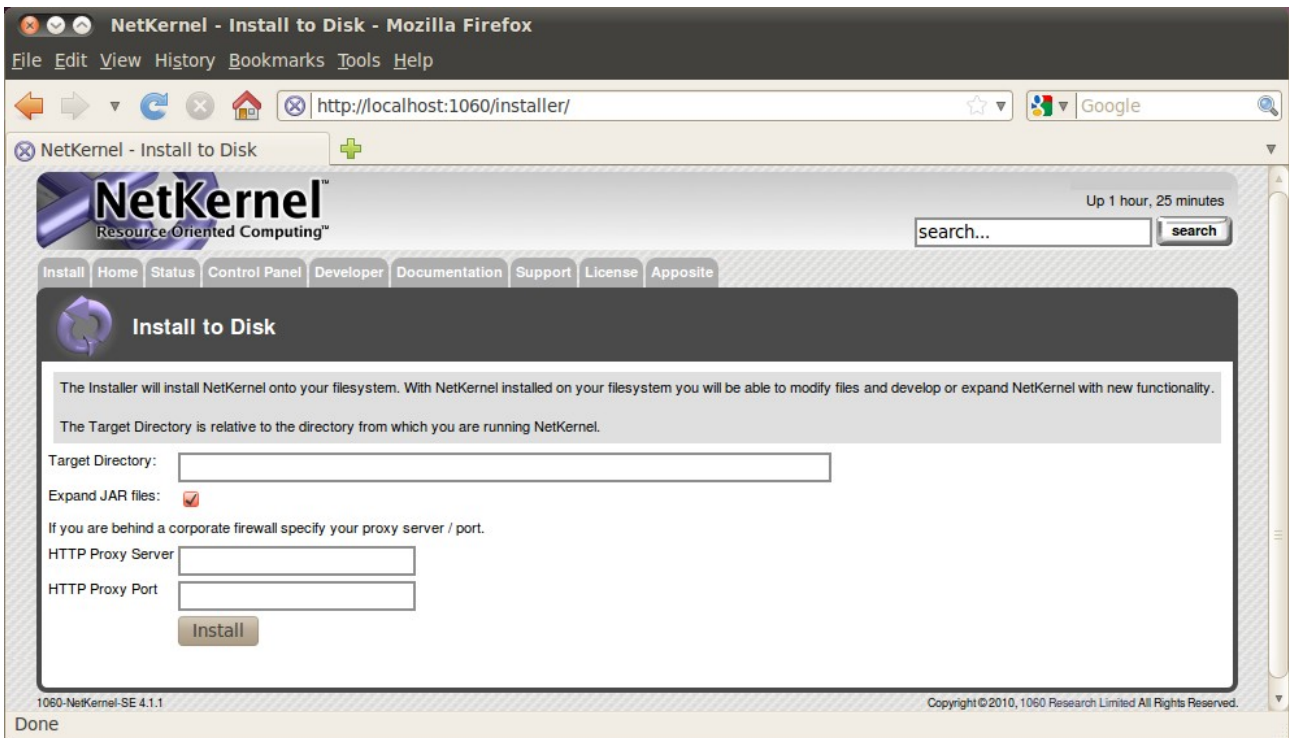
## Installation – all environments

By all means, browse through the tabs and check stuff (you probably did not read that *Readme first*, did you ?). When you're ready for the installation to disk, select the *Install* tab.



I do wonder what that option does. Lets find out and press it !

Do read the license you'll see next. This book is concerned only with the (open source) NetKernel Standard Edition. **If you cannot comply with the public license terms you must obtain a commercial license from [www.1060research.com](http://www.1060research.com).**



All the earlier positioning pays off here, for by entering NK4 in the *Target Directory* field the installation will go where I want it (as well on Windows as on Linux).

Press Install ...

### Verification – Windows

The following message will show :

*NetKernel was successfully installed onto your filesystem at **D:\NK4***

Check this visually, there should be five new subdirectories underneath D:\NK4.

```
D:\NK4>dir
Volume in drive D is xxxx
Volume Serial Number is xxxx-xxxx

Directory of D:\NK4

04/09/2010  21:18    <DIR>          .
04/09/2010  21:18    <DIR>          ..
04/09/2010  21:18    <DIR>          bin
04/09/2010  21:18    <DIR>          etc
04/09/2010  21:18    <DIR>          lib
04/09/2010  21:18    <DIR>          log
04/09/2010  21:18    <DIR>          modules
                0 File(s)                0 bytes
                7 Dir(s)   x bytes free
```

### Verification – Ubuntu

The following message will show :

*NetKernel was successfully installed onto your filesystem at **/usr/NK4***

Check this visually, there should be five new subdirectories underneath /usr/NK4.

```
dexter@ubuntumachine:/usr/NK4$ ls -la
total 28
drwxr-xr-x  7 dexter dexter 4096 2010-09-04 21:16 .
drwxr-xr-x 14 root    root   4096 2010-09-04 17:20 ..
drwxr-xr-x  2 dexter dexter 4096 2010-09-04 21:16 bin
drwxr-xr-x  4 dexter dexter 4096 2010-09-04 21:16 etc
drwxr-xr-x  4 dexter dexter 4096 2010-09-04 21:16 lib
drwxr-xr-x  2 dexter dexter 4096 2010-09-04 21:16 log
drwxr-xr-x 36 dexter dexter 4096 2010-09-04 21:16 modules
```

## Stopping downloaded jar – all environments

You are now almost ready for your first run. Press CTRL-C in the window where you are running the downloaded jar. This will stop the installation-run.

```
...
^CI 16:30:58 Kernel          NetKernel Pausing, flushing pending
requests, new requests queued...
I 16:30:58 HTTPTransport~ Decommissioning HTTP Transport
I 16:30:58 HTTPTransport~ Graceful shutdown {}
```

## First run from disk – Windows

```
C:\Users\your_user>d:
D:\>cd NK4
D:\NK4>bin\netkernel.bat
```

```
I 16:44:58 Kernel
Starting 1060-NetKernel-SE
Resource Oriented Computing Platform
Version 4.1.1
...
I 16:45:29 Kernel          NetKernel Ready, accepting requests...
I 16:45:29 ModuleManager System now at RunLevel [7]
I 16:45:29 InitEndpoint  Init completed - system at RunLevel [7]
I 16:45:29 CronTransport Added Job [Apposite Synchronize @ Every
3rd Day] of type [crontab]
```

## First run from disk – Ubuntu

```
dexter@ubuntumachine:~$ cd /usr/NK4
dexter@ubuntumachine:~$ bin/netkernel.sh
```

```
I 17:40:15 Kernel
Starting 1060-NetKernel-SE
Resource Oriented Computing Platform
Version 4.1.1
...
I 17:41:08 Kernel          NetKernel Ready, accepting requests...
I 17:41:08 ModuleManager System now at RunLevel [7]
I 17:41:08 InitEndpoint  Init completed - system at RunLevel [7]
I 17:41:08 CronTransport Added Job [Apposite Synchronize @ Every
3rd Day] of type [crontab]
```

## Verification – all environments

If all is well, you can now once again :

- fire up your favorite webbrowser
- enter `http://localhost:1060`

And you should get this screen :



The only visible difference with the NetKernel Management Console we saw earlier is that the *Install* tab is no longer there.

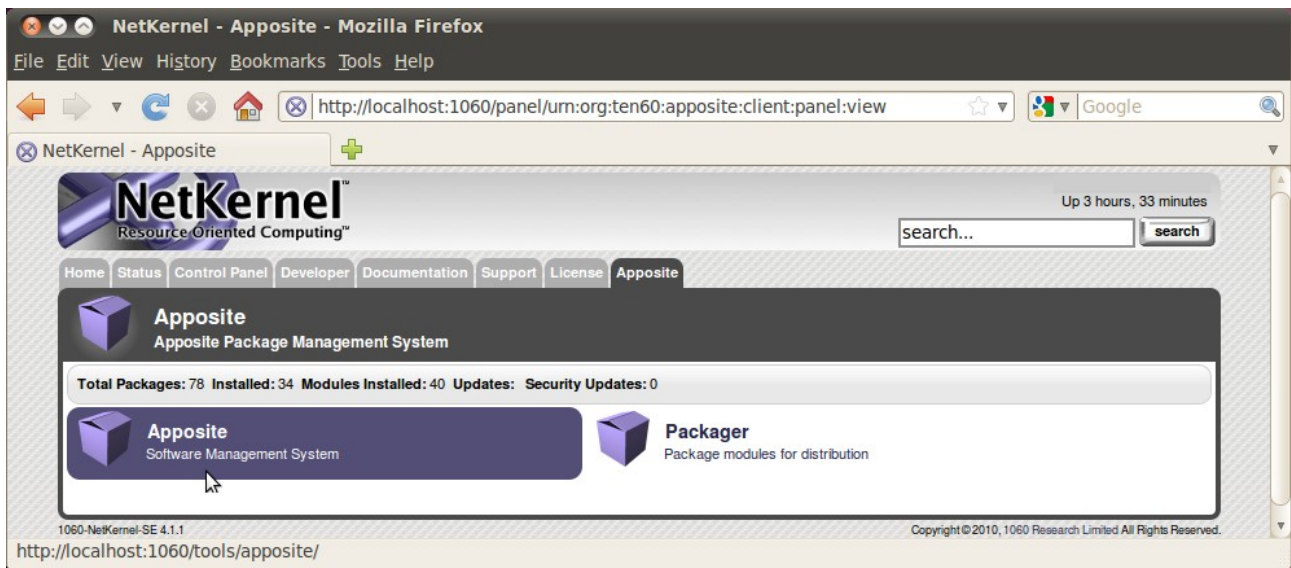
## Apposite – all environments

Before you do anything else, you should update the current NetKernel modules, to make sure you have all security and other patches. NetKernel has a *Software Management System* called *Apposite* to take care of this. In fact, *Apposite* itself is managed and updated this way, as is every part of NetKernel.

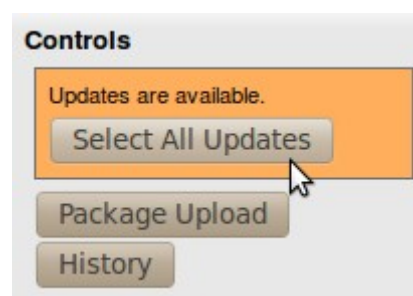


The default Base URI for the Apposite repository is <http://apposite.netkernel.org/repo/>. If your NetKernel instance does not have access to the internet, you'll not be able to reach this. In that case you should **first** set up your own. [Appendix B](#) explains how to do this. Only then continue with the remainder of [Appendix A](#).

Select the *Apposite* tab.



Packaging is discussed elsewhere in this book. Select and press *Apposite*.



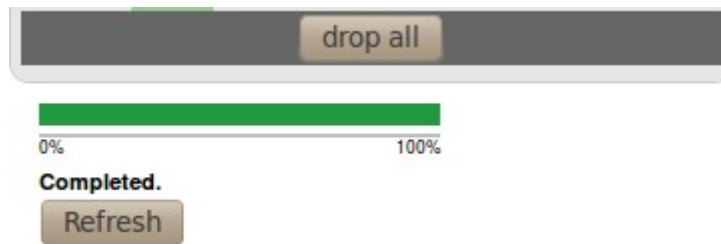
You should see **orange** ! There should be updates available, very likely (you can see this if you scroll down the page) for *Apposite* itself. If there are no updates available at this point ... something went wrong in an earlier step.

The action to take suggests itself rather clearly ... press *Select All Updates*.

Selections		
	Action	Package
drop	update	apposite - 1.20.1
drop	update	coremeta - 1.3.1
drop	update	database-relational - 1.4.1
drop	update	http-client - 1.4.1
drop	update	http-server - 1.10.1
drop	update	kernel - 1.11.1
drop	update	lang-dpml - 1.10.1
drop	update	lang-groovy - 1.5.1
drop	update	layer0 - 1.26.1
drop	update	layer1 - 1.12.1
drop	update	module-standard - 1.16.1
drop	update	nkse-control-panel - 1.14.1
drop	update	nkse-cron - 1.6.1
drop	update	nkse-dev-tools - 1.16.1
drop	update	nkse-doc-content - 1.17.1
drop	update	nkse-docs - 1.10.1
drop	update	nkse-http-fulcrum-backend - 1.2.1
drop	update	nkse-search - 1.6.1
drop	update	nkse-visualizer - 1.6.1
drop	update	nkse-xunit - 1.4.1
drop	update	pds-core - 1.4.1
drop	update	system-core - 0.11.1
drop	update	wiki-core - 1.4.1
drop	update	xml-core - 1.6.1
		drop all
Apply Selections		

A *Selections* list will appear. You can see the list I get for version 4.1.1. above, yours may differ. I do know that you immediately want to add other stuff (Python for example) as well, but **don't** ! Take the logical next step, press *Apply Selections*.

Be patient, depending on which repository you use this may take a minute or so. Underneath the Selections list you'll get an update of what's going on. When finished you'll see a *Refresh* button appear there ... like this :



Guess what you have to do next. That's right ... press *Refresh*. If all goes well you should get the *Apposite* screen back, with all updated packages showing their new version number and all **orange** gone !

## Conclusion

Installing NetKernel is – considering what you get in return – pretty simple and uniform across platforms. For a production system you might want to run NetKernel as a service or a daemon that gets started at boottime. [Appendix C](#) deals with setting that up.



## Setting up your own Apposite Repository

### Prerequisites

There is a bit of a 'chicken and the egg'-problem<sup>8</sup> here. The reason you would need your own Apposite Repository is that you do or will not allow your NetKernel instance access to the internet. However, in order to set up your own Apposite Repository, you will need access to the internet. No way around it I'm afraid. It does however not have to be from the machine you run your NetKernel instance on !

I'll discuss a setup via the **rsync**-utility on **Windows 7** and **Ubuntu 10.04 LTS - the Lucid Lynx**. For Ubuntu this utility is present by default, for Windows 7 we'll use the one available in the **Cygwin** package. Don't worry if Cygwin means nothing to you, I'll discuss the setup for that as well.

In fact, that's what I'm going to do first ...



Yes, I do know that there are other rsync ports available for Windows. Feel *free* to use them ... most of them are not (free to use that is). Some of the others are limited to specific usages. Trust me, it will do you no harm to have a Linux-like shell with lots of Linux-utilities available on your Windows machine. You can thank me later !

### Preparation

#### Getting Cygwin – Windows 7 only

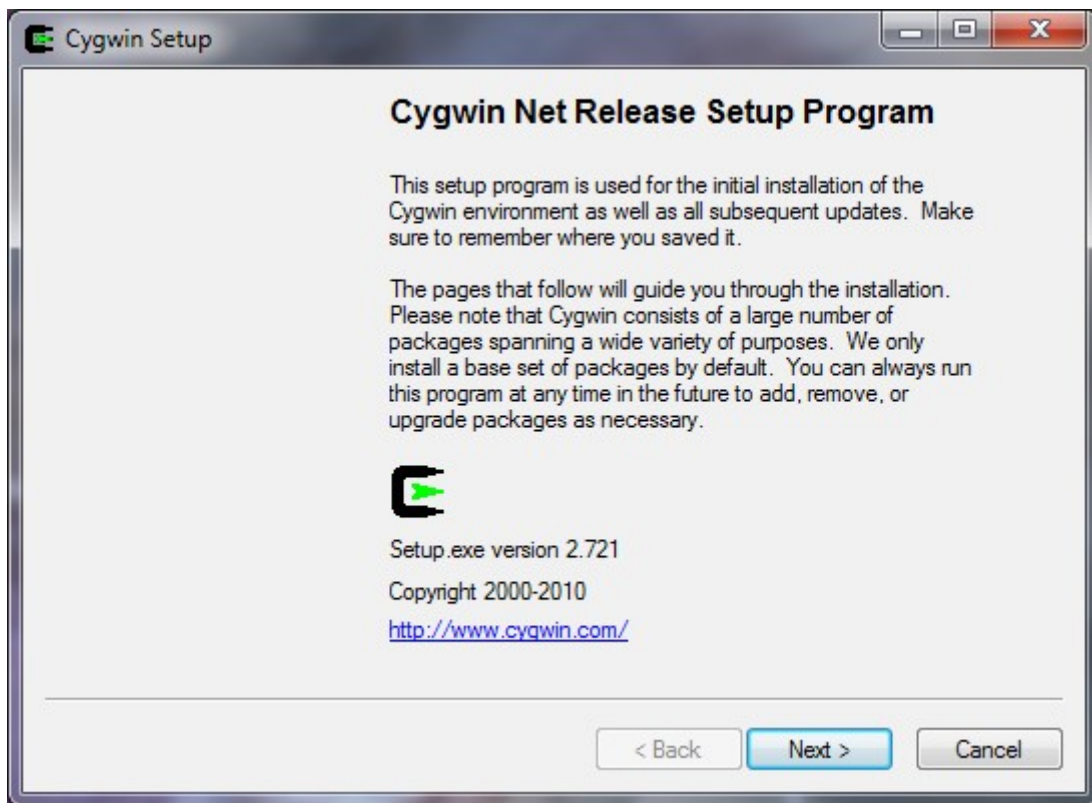
You can get the Cygwin setup file at <http://www.cygwin.com/setup.exe>. Download it. Note that not only the first install is done with this file, but also all subsequent updates (or installation of new utilities you may require). So download it to a place where you can find it again (I keep it on my desktop in fact).

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<sup>8</sup> That one has been solved by science, the chicken came first. Something to do with a certain protein.

## Installing Cygwin – Windows 7 only

Start the downloaded *setup.exe*.



Read *the text* (told you about keeping the setup.exe, didn't I ?)  
Press *Next*

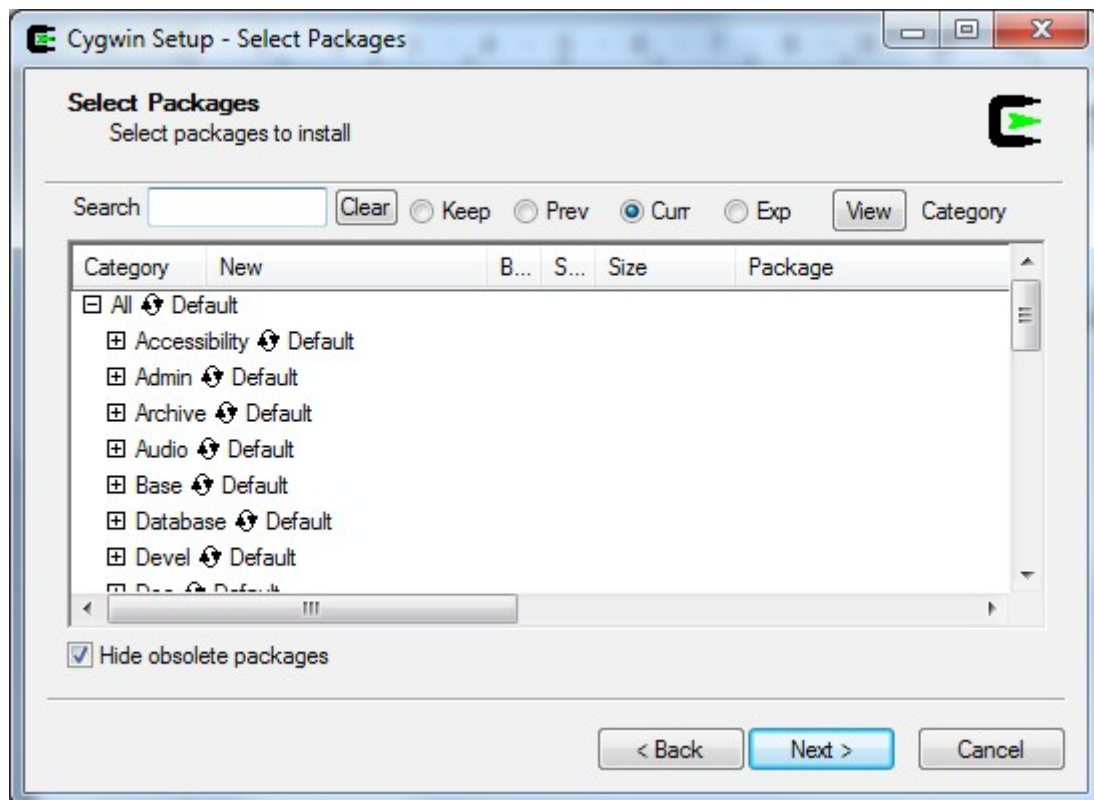
Select *Install from Internet*  
Press *Next*

Enter *the location* and *the users* for Cygwin.  
I entered **D:\cygwin** and selected the recommended user option.  
Press *Next*.

Enter *the location* you want Cygwin to download its packages to  
I entered **D:\cygwin\downloads**.  
Press *Next*

I use a *Direct Connection* to the Internet, your connection settings may differ ...  
Press *Next*

Choose a *mirror* near you.  
Press *Next*.



Finally we are getting to the packages (Linux utilities) that are going to be installed. For the most part the defaults are fine, but there are two packages that you want to select extra under the **Net**-heading (expand that heading and click on the skip in front of the packages ... the skip will be replaced by a version number) :

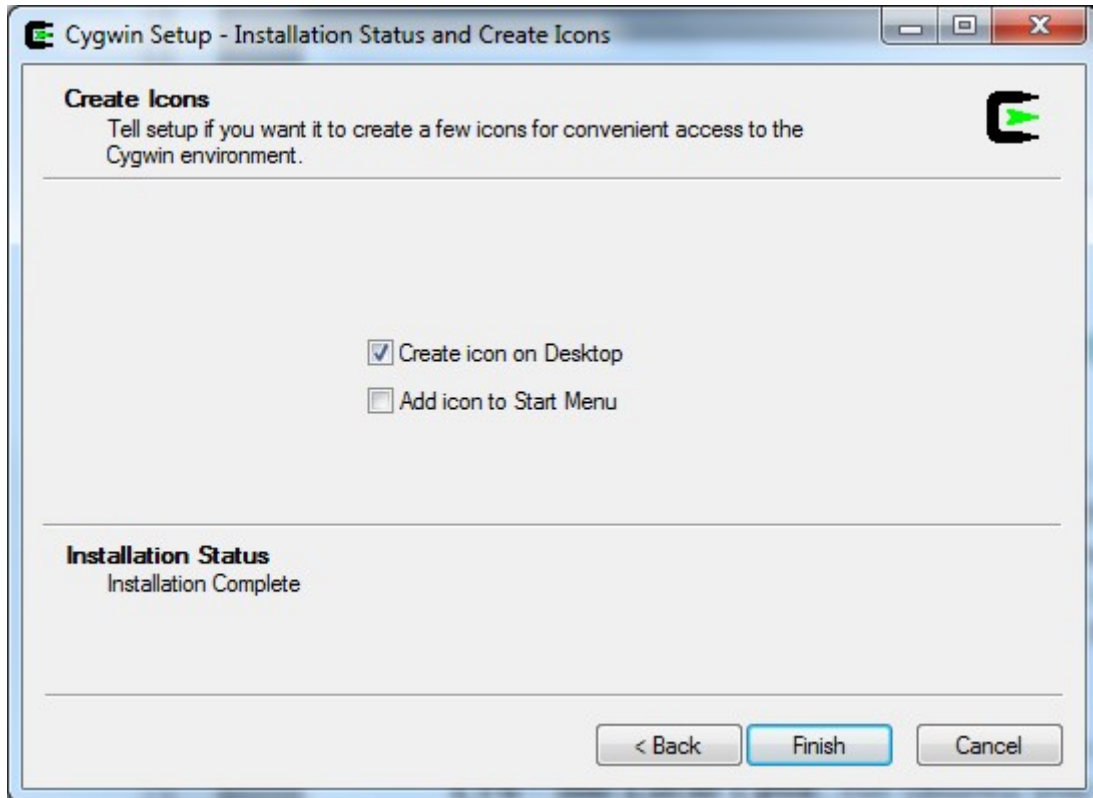
- openssh
- rsync

Press Next

Confirm that you want to select the packages that resolve the dependencies.

Press Next

The installation will now run for a bit ...



Select how you want to be able to reach Cygwin.  
Press *Finish*

Congratulations ! You are now the proud owner of a quite decent Linux environment on your Windows machine.

### **Non-root user – Ubuntu only**

If the Linux machine for the Apposite Repository differs from the NetKernel machine, you will benefit from creating the same non-root user we created for the NetKernel machine.

```
your_user@ubuntumachine:~$ sudo groupadd --gid 1060 dexter
your_user@ubuntumachine:~$ sudo useradd --uid 1060 --gid 1060 -m \
-d /home/dexter -s /bin/bash -c 'Apposite Repository' dexter
your_user@ubuntumachine:~$ sudo passwd dexter
```

## Synchronization

### Creating the repository – Windows 7

Create a directory to hold the repository:

```
C:\Users\your_user>mkdir d:\repo
```

### Creating the repository – Ubuntu

Create a directory to hold the repository:

```
your_user@ubuntumachine:~$ sudo mkdir /repo
```

```
your_user@ubuntumachine:~$ sudo chown dexter:dexter /repo
```

### Synchronizing the repository – Windows 7

Start your *Cygwin shell* (doubleclick the icon that was created on your desktop).

```
your_user@windowshost ~
```

```
$ mkdir /repo
```

```
your_user@windowshost ~
```

```
$ mount d:/repo /repo
```

```
your_user@windowshost ~
```

```
$ rsync -rv rsync://apposite.netkernel.org/download/repo/ /repo/
```



If you are using a firewall (you should) it will now ask you if **rsync** is allowed access to the Internet. Grant that access. A second later it will come back to ask if rsync may act as a server. It may.

The synchronization will take a while, the repository is (September 2010) about 250Mb.

```
...
```

```
packages/Y/
```

```
packages/Z/
```

```
sent 10335 bytes  received 265302027 bytes  304082.94 bytes/sec
```

```
total size is 265230673  speedup is 1.00
```

```
your_user@windowshost ~
```

```
$ umount /repo
```

```
your_user@windowshost ~
```

```
$ rmdir /repo
```

```
your_user@windowshost ~
```

```
$ exit
```

## Synchronizing the repository – Ubuntu

Log on to the system as the non-root user we created earlier.

```
dexter@ubuntumachine:~$ rsync -rv \  
rsync://apposite.netkernel.org/download/repo/ /repo/
```

The synchronization will take a while, the repository is (September 2010) about 250Mb.

...

packages/Y/

packages/Z/

```
sent 10335 bytes  received 265302027 bytes  318311.17 bytes/sec  
total size is 265230673  speedup is 1.00
```

## Verification – Windows 7

You should see two directories in the repository.

```
C:\Users\your_user>dir d:\repo  
Volume in drive D is xxxx  
Volume Serial Number is xxxx-xxxx
```

Directory of d:\repo

```
09/09/2010  21:17    <DIR>          .  
09/09/2010  21:17    <DIR>          ..  
09/09/2010  21:17    <DIR>          netkernel  
09/09/2010  21:17    <DIR>          packages  
                0 File(s)                0 bytes  
                4 Dir(s)  x bytes free
```

## Verification – Ubuntu

You should see two directories in the repository.

```
dexter@ubuntumachine:~$ ls -la /repo  
total 16  
drwxr-xr-x  4 dexter dexter 4096 2010-09-09 21:31 .  
drwxr-xr-x 23 root    root  4096 2010-09-09 21:06 ..  
drwxr-xr-x  3 dexter dexter 4096 2010-09-09 21:31 netkernel  
drwxr-xr-x 38 dexter dexter 4096 2010-09-09 21:31 packages
```

## Use

There are several ways you can go about this. You can **serve** the Apposite Repository to the NetKernel instance(s) through a webserver. In Chapter 3 we do exactly that when I show how you can use NetKernel as a webserver.

Another option is to **map** the Apposite Repository over your internal network to the NetKernel instance(s). Windows has several options for just that and with **Samba**<sup>9</sup> you can easily map a Linux directory to a Windows machine (the other way around remains a tricky thing though).

For the rest of this Appendix I assume that you have **manually copied** the Apposite Repository to the machine that is running the NetKernel instance.

Whatever option you take, remember to frequently resynchronize with the central repository on the internet ! Once a month for example will not hurt at all.



Automate this task or have it automated. It is all very well to be closed off from the *evil* internet, and no, you do not always need the latest and the greatest, but you do need security patches and the occasional new functionality. If you have to do it manually you'll forget after a while.

### Activating your personal Apposite Repository – Windows

So, the assumptions are as follows :

- You are running the NetKernel instance on this machine.
- You've copied the synchronized Apposite Repository to this machine, in my case that is to **D:\repo**.

Navigate your browser to the NetKernel Apposite screen (<http://localhost:1060> and so on, remember ?).

Press the Admin button.

Edit the Base URI of the repository so the screen looks like this :

Name	Base URI	Path	PublicKey	Trusted	Sets
NetKernel.org file:///D:/repo/		1060-NetKernel-SE/4.1.1/		<input checked="" type="checkbox"/>	<input type="checkbox"/>
					<input type="button" value="add set"/>
					main <input type="button" value="edit"/> <input type="button" value="test connection"/> <input type="button" value="delete"/>
					universe <input type="button" value="edit"/> <input type="button" value="test connection"/> <input type="button" value="delete"/>
					multiverse <input type="button" value="edit"/> <input type="button" value="test connection"/> <input type="button" value="delete"/>

1060-NetKernel-SE 4.1.1

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9 <http://www.samba.org>

Yes, the Base URI is now **file:///D:/repo/**. Windows loves slashes !  
Make sure to test the connection !

## Activating your personal Apposite Repository – Ubuntu

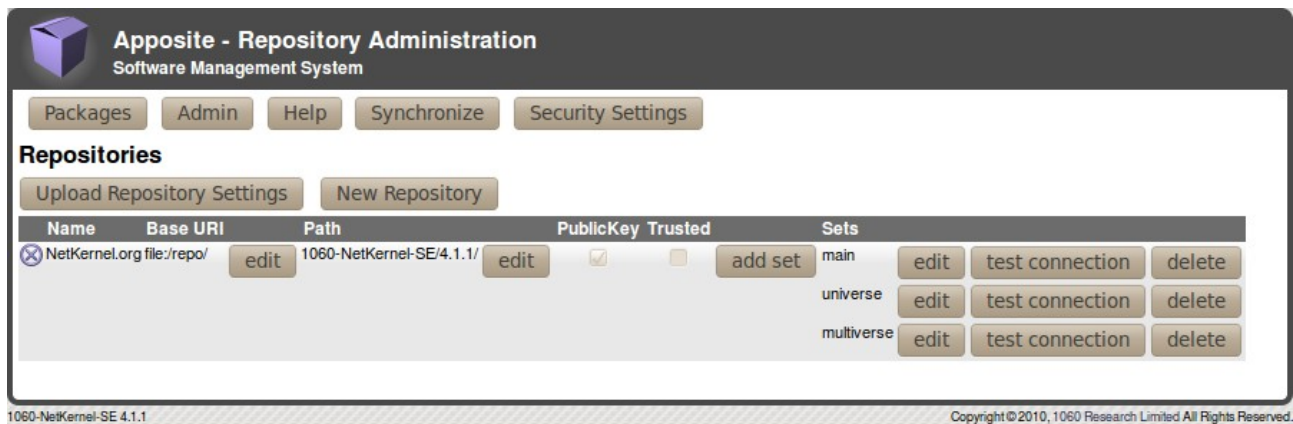
So, the assumptions are as follows :

- You are running the NetKernel instance on this machine.
- You've copied the synchronized Apposite Repository to this machine, in my case that is to **/repo**.

Navigate your browser to the NetKernel Apposite screen (http://localhost:1060 and so on, remember ?).

Press the Admin button.

Edit the Base URI of the repository so the screen looks like this :



The screenshot displays the 'Apposite - Repository Administration' web interface. At the top, there are navigation buttons: 'Packages', 'Admin', 'Help', 'Synchronize', and 'Security Settings'. Below this is the 'Repositories' section, which includes 'Upload Repository Settings' and 'New Repository' buttons. A table lists the repository details:

Name	Base URI	Path	PublicKey	Trusted	Sets
NetKernel.org file:/repo/	file:/repo/	1060-NetKernel-SE/4.1.1/	<input checked="" type="checkbox"/>	<input type="checkbox"/>	main universe multiverse

Each repository entry has an 'edit' button next to the Base URI and Path, and an 'add set' button next to the Trusted checkbox. The Sets column lists 'main', 'universe', and 'multiverse', each with its own 'edit' and 'test connection' buttons. The footer of the interface shows '1060-NetKernel-SE 4.1.1' on the left and 'Copyright © 2010, 1060 Research Limited All Rights Reserved.' on the right.

So, the Base URI is now **file:/repo/**.  
Make sure to test the connection !

## Conclusion

Setting up your own **Apposite Repository** is not hard at all. I would even dare to say it is an advisable thing to do :

- Your security team – if you have one – will be pleased.
- If you have multiple NetKernel instances running, your updates will be much swifter from a local (local as in 'on your local network') repository.

However, I would also advise to :

- Automate the synchronization with the official repository.
- Update your instances frequently.



One more thing to note ... the packages in a local repository are no less secure than those on the official repository. I quote :

*The public apposite repository only has signed official releases of 1060 authorized packages. Both the individual packages and the complete repository metadata are signed. When you have a local copy inside your firewall the NKSE apposite client still performs full repository and package authentication and verification before permitting anything from the the mirror to be installed. So even though the library is local you can still treat it as the authentic trustworthy source of NKSE libraries and updates.*

And that's all I have to say about that.

### Running NetKernel as a service / daemon started at boottime

#### Prerequisites

<to be continued/>

## Locking down your NetKernel instance

### Prerequisites

<to be continued/>