

Large Pages and Rybka – draft FAQ

What are large pages?

Very simplistically, something in your computer called the Translation Lookaside Buffer (TLB) keeps track of what is in the RAM of your machine. The hash table of Rybka resides in the RAM of your machine. Using large pages allows your computer to avoid TLB cache misses which in turn improves Rybka performance by up to 15%. Generally, the larger the hash table size you use for Rybka, the more the speedup over non-large page Rybka will be.

Which versions of Windows support large pages?

The Microsoft documentation indicates that large page support can be enabled on the following Windows operating systems:

Windows Server 2003 (SP1 and later)
Windows Server 2008 (R1 and R2)
Windows Vista
Windows 7

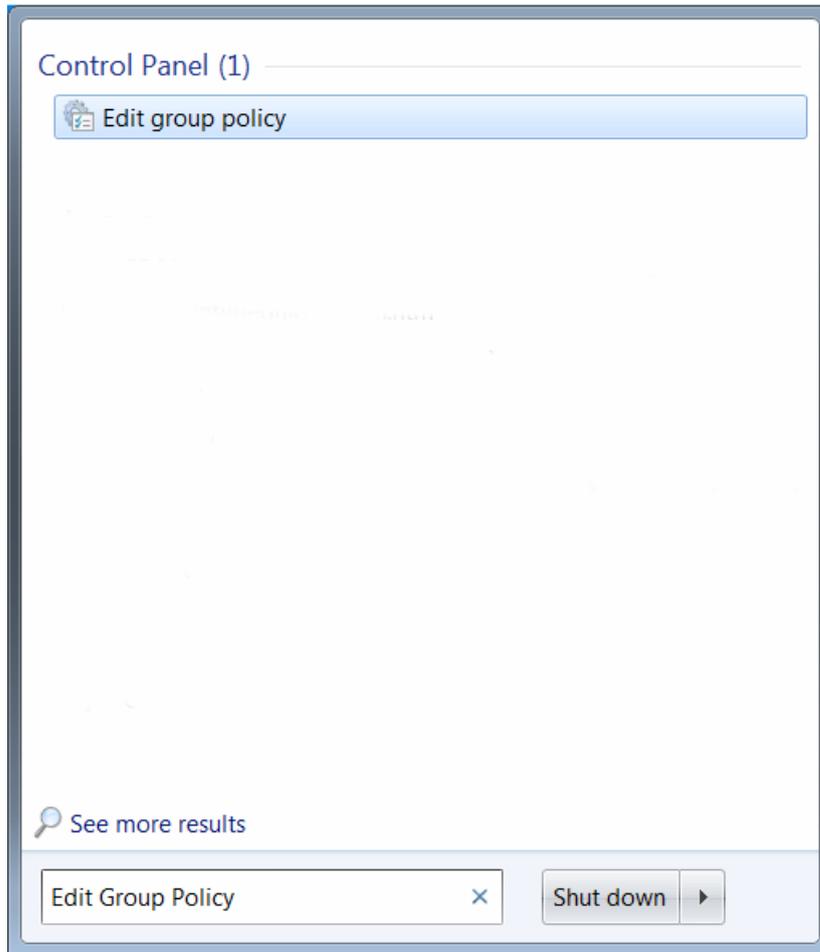
The Microsoft documentation also suggests that Windows XP users cannot use large pages, but we found that Rybka running on Windows XP 64-bit at least does indeed use large pages.

How to do I enable Windows 7 for large page use?

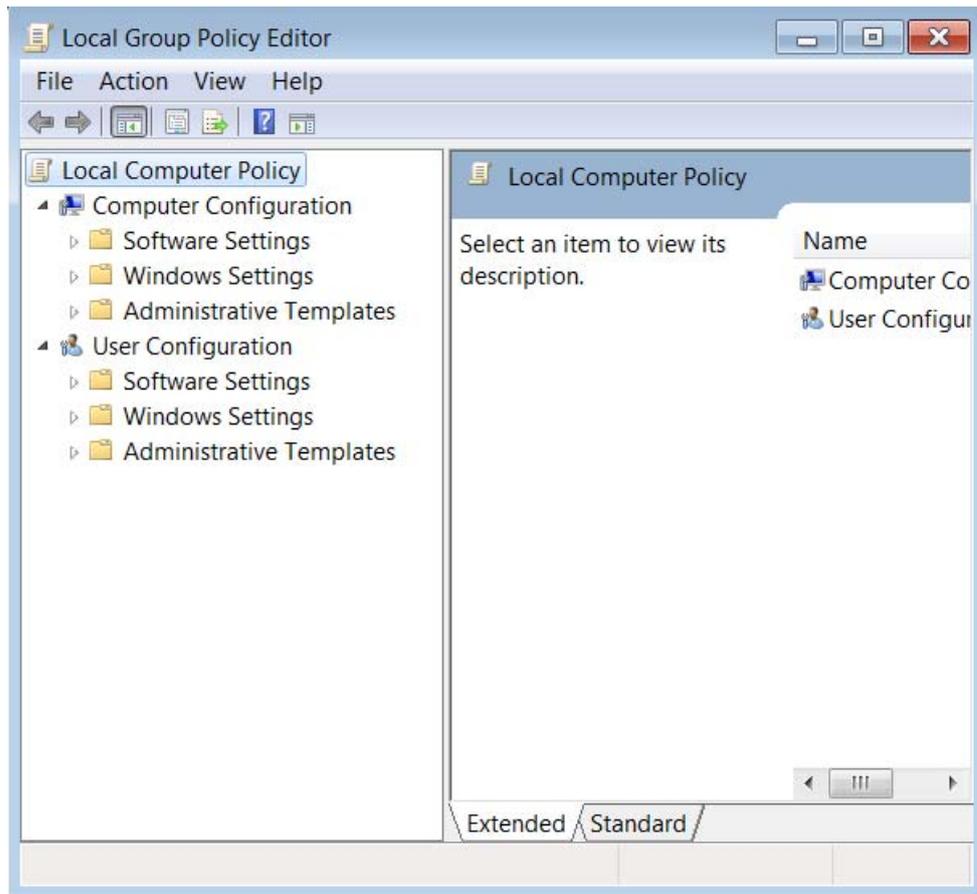
You cannot just click the “Use Large Pages” checkbox on the Rybka options for this to work, you need to do some other things in Windows as well.

Using large pages requires a special privilege. Your userid (or the Windows group that your userid belongs to) needs to have a Windows privilege called "Lock pages in memory".

To add this privilege to your account on Windows 7, start the Group Policy Editor by typing “Edit group policy” into the Windows start button at the bottom left of the screen:



Press enter and this starts the Local Group Policy Editor which looks like the following:



Under “Computer Configuration” expand the following:

Windows Settings

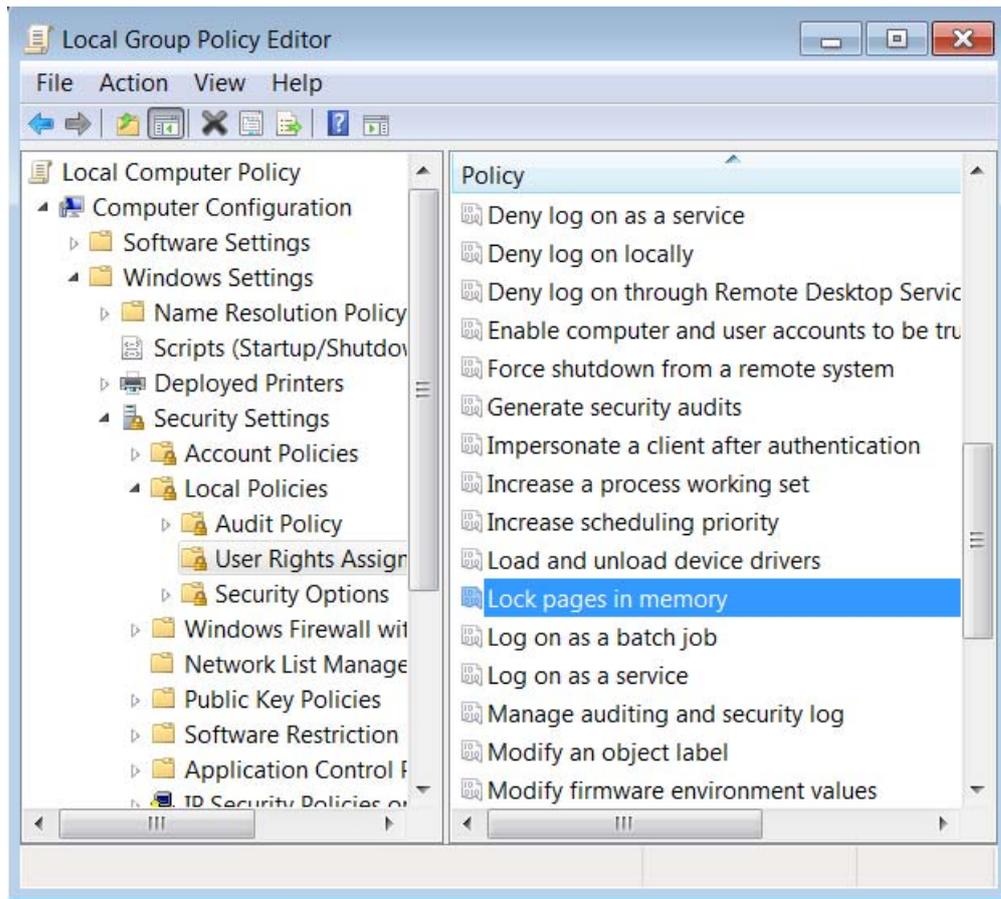
Security Settings

Local Policies

Click on User Rights Assignment

Select the right hand side pane, scroll down and select “Lock Pages in Memory”

You should see a screen like the following:



Double-click on “Lock pages in memory”

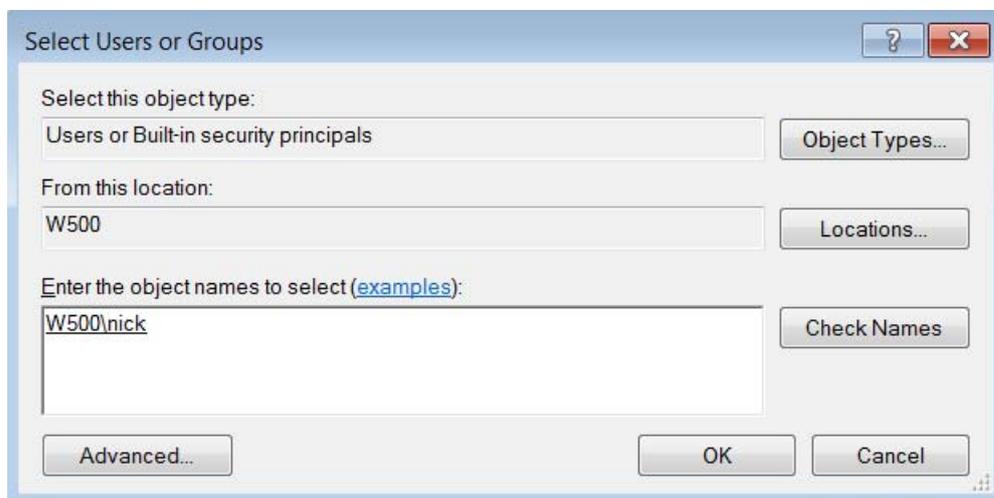
Click the “Add User or Group” button

Click the “Advanced” button

Click the “Find Now” button

Scroll down the search results list and double-click your userid

You should see a screen like the following:



Click “OK” and your userid now has the “Lock pages in memory” privilege. You need to logoff and back on again for it to take effect, so do that now.

Ok I have enabled “Lock page in memory” privilege, what else do I need to do?

When you run Rybka you need to either have:

(a) User Access Control (UAC) switched **off** (Google for how to do this)

Or

(b) Start Rybka with Administrative privilege (right click, “Run as administrator”), it’s your choice, however if you don’t do one or the other, Rybka will not use large pages.

(c)

You don’t need both.

Note that if you are using a GUI (for example Aquarium or the Chessbase GUI) and you choose option (b), then you can start the GUI with Administrative privilege and Rybka running inside the GUI will inherit this privilege.

Ok I have done all that now what else?

So now you can check the “Use Large Pages” option of Rybka and Rybka should use large pages.

How do I know if my Rybka is using the Large pages?

The way I do this is to enable the Rybka log (not the xlog), load the Rybka engine and look in the log. The log is in the same directory as the Rybka executable and has the name uci.<data>.<number>.txt.

A successful allocation of a hash table of 2GB with large pages looks like this in the log:

```
-->> setoption name Use Large Pages value true
      Use large pages enabled.
      -- shared synchronization file: RybkaSync13744
      -- shared exchange file: RybkaEx23744
      Using large pages, size = 2147483648
      Using large pages, size = 2147483648
```

A failure when trying to obtain large pages looks something like this in the log:

```
-->> setoption name Hash value 256
      -- shared synchronization file: RybkaSync14432
      -- shared exchange file: RybkaEx24432
    <<-- ERROR: API          = CreateFileMapping
    <<--          error code = 1450
    <<--          message   = Insufficient system resources exist to
complete the requested service.
```

Large pages not used - CreateFileMapping () returned invalid handle.
Please check memory fragmentation, privileges and UAC (and reboot if
necessary).

In the failure case, you may need to reboot. Usually when using large pages, the first time you load Rybka the large page allocation will work, but on subsequent loads it may fail due to memory fragmentation. It is recommended that you reboot, load Rybka once and keep this Rybka loaded throughout your session.