

## Image / slide conversion with (VIPS) software. Installation + tips (for big data sets)

<http://www.vips.ecs.soton.ac.uk/index.php?title=VIPS> ( main portal with links and info)

<http://www.vips.ecs.soton.ac.uk/index.php?title=Supported> (software links Windows / Mac / Linux)

VIPS is an image processing system that can work with large images without loading the entire image into RAM. It includes a library, libvips, and a graphical interface, nip2. As of libvips 7.28.3 and nip2 7.28.2, VIPS / nip2 supports reading whole-slide images with OpenSlide (it can read Mirax / Aperio and common other slide- and image formats). Under Windows the current software is 32-bit (max file size boundary : 4GB), but under Linux the software is standard 64-bit without file size limitations. Windows 7 won't give problems during normal image / slide conversions but your PC should have at least 8GB RAM (but rather 16GB or more) and a decent processor.

Please install the required components under Windows: download, unpack and install **nip2-7.38.1-1-setup.zip** (or higher) on your system. Also, download and unpack in a folder of your choice: **vips-dev-7.38.2-1.zip** (or higher).

### Slide / Image Zoomify conversion steps under Windows

**Step 1.** *Acquiring crop values per slide (remove redundant image space, reducing the required amount of tile folders and files) under Nip2 in Windows*

If you don't need cropping, only tiling, go to step 2.

Start the Nip2 program, open the required slide / image file. Right click the A1 Tab and choose Edit. Maximize the Edit screen, choose View menu - 'zoom to fit' to easily see where you want to put the crop region in the slide.

When ready you can press Ctrl and drag with your mouse left button on the slide image in order to create a region of interest (ROI). Afterwards you can easily drag the area borders with the left mouse button to their final place.

When satisfied with the crop region, close the edit window (red cross in top corner) and right-click on the new (probably A2) Tab (with the region) and choose 'Header'.

Under Image history, please copy the 4 crop area numbers after the last .v code and before the final date info. For instance 35432 83224 25338 38728 (= crop area with left, top, width and height).

Keep a record text file of all your original slide files and their area crop values! Close a finished file with the grey cross on the A column (delete the column) before opening a next file. If you have all the crop values of all the files, go to step 2.

## Step 2. Zoomify tiling from the command prompt with vips (under Windows)

In the Windows explorer : hold Shift and right-click in the folder with the vips.exe file and choose 'Open command window here' You will get the black cmd.exe command screen.

Below (in yellow) are two fictive examples of input strings which you can build and copy - paste (right-click at command prompt and choose Paste) and execute by hitting enter (execution can take time, wait for blinking cursor to appear afterwards!):

```
vips extract_area "F:\mirax\118 Ileum mens S100.mrxs" F:\cask\slidename.dz[layout=zoomify]
35432 83224 25338 38728
```

This above command string crops (with the crop values from step 1) before tile output. The input file path should be between "" The output slidename.dz is the output filename (better use only lowercase and underscores) + .dz (example: 118\_ileum\_mens\_s100.dz)

Vips 7.36 and later let you use .dz as a filename suffix, meaning send the image-data to dzsave. This means you can write the output of any vips operation to a Pyramid tiled format (Deep zoom (default), Zoomify or Google). The arguments to extract\_area are image-in, image-out, left, top, width, height. So the above command will cut out a 25338 by 38728 pixel area from the left/top position (x: 35432 ; y: 83225) of the slide image, then build the Zoomify tiles layout using just those pixels.

After this cropping + tiling command you should rename the output-folder by removing the .dz before uploading slide folders to the slide server.

Without the need for cropping (with values from Nip2 or elsewhere) the command / operation is easier as you only have to execute the tiling command directly from the command prompt. The output folder slidename (lowercase, only underscores) won't need the .dz extension as you use dzsave directly:

```
vips dzsave "F:\mirax\118 Ileum mens S100.mrxs" F:\cask\slidename --layout zoomify
```

After these steps your zoomified images / slides should be ready for upload to the slide webserver! The uploading of new content can be done 1:1 with a FTP program or in a zipped format (all files bundled into one container file, can be done with Windows or loose program). This last option can be handy (saving much time) if you have really big slides (with extreme amounts of small files in each slide folder). In that case you have to unzip the zipped files to their right location on the webserver (by script or program) after FTP uploading.