

Sentinel-1 Toolbox

SNAP Processing with Limited Memory

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About this Tutorial

The goal of this tutorial is to demonstrate ways to use SNAP when computing resources, in particular computer memory, are limited.

Satellite imagery products can at times be quite large and may require a lot of computing resources to process.

Recommended Computing Hardware

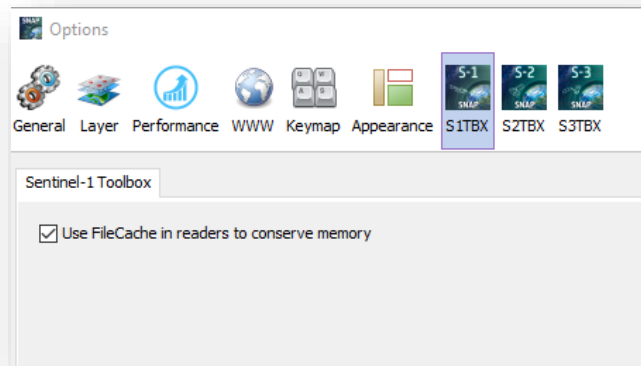
SNAP can process Earth observation (EO) data products on Linux, Windows or Mac OS. To process full EO data products, it's recommended to have a system with at least 16GB of Random Access Memory (RAM). For improved reading and writing performance, it is ideal to have the data on a Solid State Drive (SSD). SNAP software is very multithreaded and processing performance can also be improved with a greater number of processing cores or threads.

However, in the absence of an ideal computer, SNAP should still be able to function with less hardware following the tips in this tutorial.

File Cached Reading

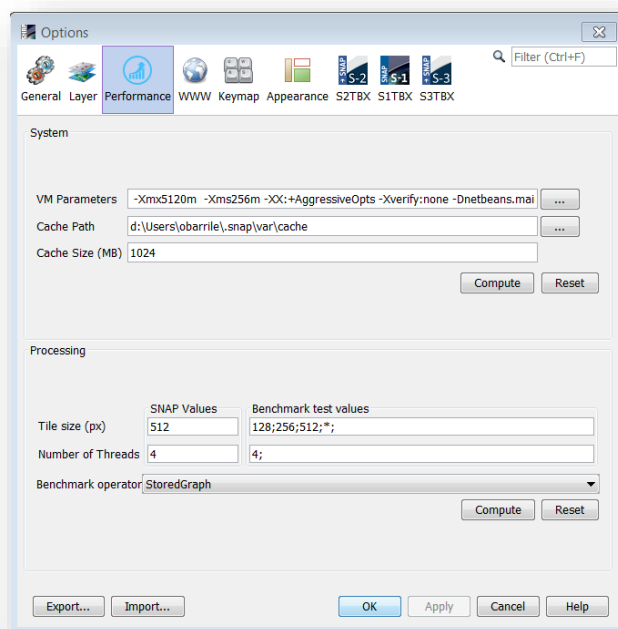
For best performance, SNAP will read a product into memory. If the image is very large or enough memory is not available, SNAP will automatically use a file cache to utilize the hard drive or SSD. The file cache will write into the .snap/var temp folder.

For GeoTiff based SAR readers like Sentinel-1, you could explicitly set to use the file cache to conserve memory. Go to the Tools -> Options menu and the S1TBX tab. From here you can enable file caching.



Performance Options

In the Tools -> Options menu go to the Performance tab to access system memory configuration. From here you could change the virtual machine memory settings. These parameters are for advanced users and can be modified only by users having write access on the snap.conf file (in [SNAP_installation_folder]/etc/). They are taken into account after the application restarts. The most effective parameters for performance are -Xmx (maximum memory) and -Xms (initial memory). The Compute button will try to determine the best memory configuration for your system.



Subsetting Products

Sometimes it's just not possible to apply heavy processing to a very large product with limited memory. In some cases, you may not need to whole product. You may want to clip the product to your area of interest using the Subset operator.

Sentinel-1 TOPSAR Split

Sentinel-1 TOPS SLC products come with multiple swaths in one product and each swath made up of many bursts of data. Rather than using the subset operator intended for typical single image products, you should use the TOPSAR Split operator to create a subset product containing only the swaths and bursts that you need for your area of interest. After splitting the product, you could apply the Deburst operator to create a single image product.

Graph Processing

Graph processing with GPT can be configured for memory usage by editing the snap/bin/gpt.vmoptions in the installation folder.

You could also configure the number of gigabytes used for the tile cache and the number of threads to process in parallel.

GPT can be configured at the command-line using
`gpt -c ${cachesize-in-GB}G -q ${parallelism}`

Application Programming Interface

If you are developing your own application and using SNAP via the Java or Python APIs, you may not need all modules of SNAP or an installed SNAP.

If you only require a particular operator or reader, you may only need to include the module which contains that operator or reader and its dependencies.

Experimental Cache Writer in Graphs

Generally, the graph processing tile cache saves copies of each processed tile in case it is needed again in the processing. To optimize performance and memory consumption there is an experimental TileCache operator. This will allow graphs to customize where a TileCache should be used by introducing the TileCache operator in strategic places in the graph.

If you want to use the TileCacheOp you need to first disable the global cache. Otherwise, data will be cached twice, and things will get worse. The simplest way is to modify the `snap.properties` file you find in the `etc` folder of the installation directory. Add the following line to it: `snap.gpf.disableTileCache = true`. This way no data is put in the tile cache anymore. This property affects the processing in SNAP Desktop and the command line with `gpt`. Alternatively, if you only want to change this property for a single run with `gpt`, you can specify it along with the command line call, e.g.

```
>gpt -Dsnap.gpf.disableTileCache=true <GRAPH_XML_FILE> ...
```

For further details on using the TileCache operator refer to <https://senbox.atlassian.net/wiki/spaces/SNAP/pages/798163029/How+to+Use+Tile+Cache+Operator+to+Improve+Memory+Consumption>



For more tutorials visit the Sentinel Toolboxes website

<http://step.esa.int/main/doc/tutorials/>



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