

The **nanocode** family of image data compressors is optimized for very high compression speeds and decompression speeds, very low latency, and modest resource requirements.

The compressors differ in the size of image segments compressed in each step, trading off compression speed, compression ratio achieved, and latency. The extreme speed of the compressors is achieved by exploiting specific features of AMD and Intel CPUs.

All compressors are available as software compressors for Windows and Linux. Most compressors are also available in firmware (LabView, VeriLog) for FPGA.

Features

- mathematically lossless compression
- for images, videos and other sensor data
- typical compression ratio of 50%
- up to 3 GB/s compression speed (single thread)
- up to 5 GB/s decompression speed (single thread)
- low latency, minimal memory footprint
- targeted at data-intensive industries, e.g. automotive
- C/C++ libraries and Python interfaces

Support for a variety of inputs

- arbitrary image sizes
- pixel depths up to 16 bit, color and grayscale
- all Bayer patterns (RGGB, RYYCy, CCCR, ...)
- big endian and little endian
- MIPI CSI2 encoded images, TDMS files
- custom input formats on request

System requirements CPU

- Windows version 10+ or Linux (all distributions)
- 64-Bit Intel or AMD processor (x86-64-v3)

System requirements FPGA

- Xilinx compatible FPGAs
- IP Cores for Vivado, runs also on NI LabView FPGA

Licensing models

The product may be used depending on the licence:

- **single**: one CPU/FPGA
- **site**: any number of CPUs/FPGAs across the site
- **project**: any number of CPUs/FPGAs within a specified project for the duration of the project
- **company**: any number of CPUs/FPGAs throughout the company

All fast software compressors and FPGA compressors are supplied with corresponding fast decompressors. In addition, fully compatible slower software decompressors are provided that are not bound to a specific licence or expiration date, and that allow decompressing archived data regardless of any license. These decompressors are about 10x slower and do not require x86-64-v3 processors.

Typical compression ratios (compressed size divided by original size) and speeds on an *Intel i5-8250U*:

Algorithm	Ratio	comp MB/s	decomp MB/s	FPGA footprint
DOLPHIN	0.53	2480	5240	small
TUNA	0.51	1230	2180	medium
BELUGA	0.48	220	440	large
SHARK	0.48	510	1100	n/a
ORCA	0.45	210	490	n/a

The FPGA footprint of the TUNA compressor on a Xilinx z7020 (Artix-7 compatible) is \approx 11k slice LUTs for the compressor and \approx 9k slice LUTs for the decompressor.

Compression ratios will vary depending on the type of data compressed. Latency is a small fraction of the frame rate (details upon request). For choosing the compressor, it is recommended to benchmark with your own data. Test versions of the compressors can be provided to gauge their performance with specific data (see contact).

The compressors vary in speed, compression ratio and complexity. Slow compressors typically achieve better compression ratios and are more complex, leading to a larger FPGA footprint. Fast compressors typically offer poorer compression ratios and have a smaller FPGA footprint.

The compressors SHARK and ORCA can be implemented on an FPGA upon request.

Contact

For more information contact us per mail:
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