

GIMPS – Great Internet Mersenne Prime Search

GIMPS GPU Computing Guide

v0.07a – 2011-12-31 by [Brain](#) (changes in red)

What can I do with my GPU (for GIMPS)?

This is a technical data sheet. More information about usage, options and compilation can be found in the [GPU Computing Forum](#) ([GPU Trial Factoring FAQ](#), [GPU LL Testing FAQ](#)) and in the application specific readmes.

Primality testing is most urgently needed. If you think of doing trial factoring work please consider joining the ["GPU to 72" sub-project](#) which tries to eliminate candidates near the current primality testing front.

Nvidia – [CUDA](#)

- Primality Testing → [CUDALucas](#) **FIND A NEW MERSENNE PRIME...**
- Trial Factoring → [mfaktc](#) **MOST GHz-DAYS...**

ATI – [OpenCL](#)

- Trial Factoring → [mfakto](#) **MOST GHz-DAYS...**

Name	mfaktc
Work type	Trial Factoring
Author	Oliver Weihe aka TheJudger
Latest Version	0.18 2011-12-20
Requirements	SW: CUDA >=4.0 For CUDA 3.2 use mfaktc 0.17 → Repository HW: see Compute Capability
Restrictions	Exponents: 1,000,000<Exponent<2^32 and prime, Factor size: Factor size<=2^95
Compute Capability	>=1.1
Uses	CPU and GPU
Compilable with	CUDA Toolkit 4.0
Download links	Repository: http://www.mersenneforum.org/mfaktc/ Source Windows Linux V0.17 version for short running assignments Download
Example Call minimized, low prio	Windows: start "mfaktc-win-64.exe" /D"X:\Computing\mfaktc_0.17" /MIN /LOW "X:\Computing\mfaktc_0.17\mfaktc-win-64.exe" → input via worktodo.txt
Remarks	Sieving done on CPU. mfakto (and mfaktc) are more efficient with larger assignments. This does not mean larger exponents, but "more work" or "longer runtime per class", generally bigger bit ranges.
GIMPS score estim.	roughly 75 GHz days/day on GTX 560 Ti & 1 CPU core see also: http://mersenne-aries.sili.net/mfaktc.php

Name	mfakto
Work type	Trial Factoring
Author	Bdot
Latest Version	0.10 2011-12-19
Requirements	SW: Catalyst driver, version >=11.4 but Catalyst driver, version >=11.9 strongly recommended (CPU) AMD APP SDK not required for Catalyst 11.10 or above, below: AMD APP SDK version >=2.5. UNINSTALL 2.4 first !!! HW: HD5xxx, HD6xxx, HD4xxx, FireStream 92xx
Restrictions (derived from mfaktc)	Exponents: 1,000,000<Exponent<2^32 and prime, Factor size: Factor size<=2^92
Compute Capability	OpenCL >=1.1
Uses	CPU and GPU
Compilable with	AMD APP SDK >= 2.5
Download links	Source Win Executable Linux 64bit
Remarks	Sieving done on CPU. mfakto (and mfaktc) are more efficient with larger assignments. This does not mean larger exponents, but "more work" or "longer runtime per class", generally bigger bit ranges.
GIMPS score estim.	roughly 90 GHz days/day on HD5770 & 2 CPU cores

Name	CUDALucas
Work type	Lucas Lehmer Test (Primality Test)
Example Call minimized, low prio	Windows: start "CUDALucas.exe -c10000 27942641" /D"X:\Computing\cudalucas.1.2.win64" /MIN "X:\Computing\cudalucas.1.2.win64\CUDALucas.cuda3.2.sm_21.WIN64.exe" -c10000 27942641 → Checkfile every 10000 iterations, Exponent 27,942,641 Multi GPU usage: Use "-D" switch for GPU number: -D0, -D1, ...
Restrictions	Exponents: $2 \leq \text{Exponent} < 151,150,000$ Exponent < 39,800,00 → 2MB FFT size Exponent < 79,600,00 → 4MB FFT size Exponent < 159,200,00 → 8MB FFT size <i>Upper limit to be verified. Also depends on VRAM size.</i>
Author	Shoichiro Yamada aka msft
Latest Version	1.4.2 2011-12-31 supports non-power-of-2-fft-sizes! 1.2(b) LATEST TRUSTED VERSION... 1.4.2 IN EVALUATION
Compute Capability	≥ 1.3 (needed for double precision)
Uses	GPU
Download links	1.2 Source 1.2 Win64 1.2 (compiled by apsen for Compute Capability 2.1 and CUDA 3.2) 1.2b Source 1.2b Win64 1.2b (compiled by apsen for Compute Capability 1.3 and CUDA 3.2) CUDA 3.2 Windows 64bit libraries: cufft64_32_16.dll , cudart64_32_16.dll 1.3 <not mentioned here> 1.4.2 Source (by msft) Win64 (13) (compiled by Brain for Compute Capability 1.3 and CUDA 4.0) Win64 (21) (compiled by Brain for Compute Capability 2.1 and CUDA 4.0) Linux64 (compiled by msft for CUDA 4.0; version string still says 1.41) CUDA 4.0 Windows 64bit libraries: cufft64_40_17.dll , cudart64_40_17.dll
GIMPS score estim.	roughly 11 GHz days/day on GTX 560 Ti

P.S.: Results from mfaktc and mfakto can be automatically submitted, see
<http://gpu.mersenne.info/spider/> for details.

P.P.S.: We still need somebody to implement the following work types on a GPU:

- [P-1 factoring](#)
- [ECM factoring](#)

Code it and enter the GIMPS hall of fame...