

PrimeGrid's 321 Prime Search

On 14 January 2014 15:26:41 UTC, PrimeGrid's 321 Prime Search found another Mega Prime:

$$3 \cdot 2^{10829346} + 1$$

The prime is 3,259,959 digits long and will enter Chris Caldwell's "The Largest Known Primes Database" (<http://primes.utm.edu/primes>) ranked 12th overall. This is the largest known prime for the $3 \cdot 2^n + 1$ form.

The discovery was made by Sai Yik Tang of Malaysia using an Intel(R) Core(TM) i5-2400 CPU @ 3.10GHz with 4 GB RAM running Windows 7 Enterprise x64. This computer took about 17 hours and 40 minutes to complete the primality test using LLR.

The prime was verified on 14 January 2014 20:23:24, by user schnabelt of Germany using an Intel(R) Pentium(R) CPU G850 @ 2.90GHz with 4 GB RAM running Windows 7 Enterprise x64. This computer took about 22 hours and 47 minutes to complete the primality test using LLR.

Credits for the discovery are as follows:

1. Sai Yik Tang (Malaysia), discoverer
2. PrimeGrid, et al.
3. Srsieve, sieving program developed by Geoff Reynolds
4. LLR, primality program developed by Jean Penné

Entry in "The Largest Know Primes Database" can be found here:

<http://primes.utm.edu/primes/page.php?id=116922>

OpenPFGW, a primality program developed by Chris Nash & Jim Fougeron, was used to check for Fermat Number divisibility (including generalized and extended). For more information about Fermat and generalized Fermat Number divisors, please see Wilfrid Keller's sites:

³⁵₁₇ <http://www.prothsearch.net/fermat.html>

³⁵₁₇ <http://www1.uni-hamburg.de/RRZ/W.Keller/GFNfacs.html>

Generalized and extended generalized Fermat Number divisors discovered are as follows:

$3 \cdot 2^{10829346} + 1$ is a Factor of GF(10829343,3)	$3 \cdot 2^{10829346} + 1$ is a Factor of xGF(10829344,9,8)
$3 \cdot 2^{10829346} + 1$ is a Factor of GF(10829345,5)	$3 \cdot 2^{10829346} + 1$ is a Factor of GF(10829345,11)
$3 \cdot 2^{10829346} + 1$ is a Factor of xGF(10829345,5,3)	$3 \cdot 2^{10829346} + 1$ is a Factor of xGF(10829345,11,3)
$3 \cdot 2^{10829346} + 1$ is a Factor of xGF(10829342,7,4)	$3 \cdot 2^{10829346} + 1$ is a Factor of xGF(10829344,11,5)
$3 \cdot 2^{10829346} + 1$ is a Factor of GF(10829344,8)	$3 \cdot 2^{10829346} + 1$ is a Factor of xGF(10829345,11,8)
$3 \cdot 2^{10829346} + 1$ is a Factor of xGF(10829344,8,3)	$3 \cdot 2^{10829346} + 1$ is a Factor of xGF(10829345,11,9)
$3 \cdot 2^{10829346} + 1$ is a Factor of xGF(10829345,8,5)	$3 \cdot 2^{10829346} + 1$ is a Factor of xGF(10829343,12,7)
$3 \cdot 2^{10829346} + 1$ is a Factor of xGF(10829345,9,5)	

Using a single core PC would have taken decades to find this prime. So this timely discovery would not have been possible without the thousands of volunteers who contributed their spare CPU cycles. A special thanks to everyone who contributed their advice and/or computing power to the search.

The 321 Prime Search will continue to seek even larger primes. To join the search please visit PrimeGrid: <http://www.primegrid.com>

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About PrimeGrid

PrimeGrid is a distributed computing project, developed by Rytis Slatkevičius, Lennart Vogel, and John Blazek, which utilizes BOINC and PRPNet to search for primes. PrimeGrid's primary goal is to bring the excitement of prime finding to the "everyday" computer user. Simply download the software and let your computer do the rest. Participants can choose from a variety of prime forms to search. With a little patience, you may find a large or even record breaking prime.

BOINC

The Berkeley Open Infrastructure for Network Computing (BOINC) is a software platform for distributed computing using volunteered computer resources. It allows users to participate in multiple distributed computing projects through a single program. Currently BOINC is being developed by a team based at the University of California, Berkeley led by David Anderson.

This platform currently supports projects from biology to math to astronomy. For more information, please visit BOINC: <http://boinc.berkeley.edu>

PRPNet

PRPNet is a client/server application written by Mark Rodenkirch that is specifically designed to help find prime numbers of various forms. It is easily ported between various OS/hardware combinations. PRPNet does not run each PRP test itself, but relies on helper programs, such as LLR, PFGW, phrot, and genefer to do the work.

For more information, please visit PrimeGrid's PRPNet forum thread:

http://www.primegrid.com/forum_thread.php?id=1215

For more information about PrimeGrid and a complete list of available prime search projects, please visit: <http://www.primegrid.com>