PrimeGrid's
321 Prime Search

On 23 Mar 2008 7:57:28 UTC, PrimeGrid, in collaboration with 321 Search, found another Mega Prime:

$$3*2^{4235414}-1$$

The prime is 1,274,988 digits long and will enter Chris Caldwell's "The Largest Known Primes Database" (http://primes.utm.edu/primes) ranked 14th overall. This is 321 Search's first mega prime and 11th prime overall. It is the second largest found mega-digit prime using LLR.

The discovery was made by Dylan Bennett of Canada using an Intel C2D @ 1.66 GHz with 2 GB RAM running Linux. This computer took almost 15 hours and 30 minutes to complete the primality test.

The prime was verified on 2 Apr 2008 5:13:16 UTC, by Dave Pickles of Canada using an AMD Athlon XP 2500+ with 512 MB RAM running Windows 2000. This computer took 18 hours 42 minutes to complete the primality test.

The credits for the discovery are as follows:

1. Dylan Bennett (Canada), discoverer
2. 321 Search
3. PrimeGrid, et al.
4. Srsieve, sieving program developed by Geoff Reynolds
5. NewPGen, sieving program developed by Paul Jobling
6. 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=84769

This is PrimeGrid's second mega prime and first 321 prime. Since the search began, just over 74108 tests have been completed by 4331 users using 7454 computers.

Using a single PC would have taken years 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 - especially Paul Underwood and the entire 321 Search community (http://www.mersenneforum.org/321search/).

PrimeGrid's 321 Prime Search will continue to search for even larger primes. To join the search please visit PrimeGrid: http://www.primegrid.com

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About PrimeGrid

Rytis Slatkevicius, the developer of PerlBOINC - a Perl-language-based port of the BOINC platform, created PrimeGrid as a test project for PerlBOINC. PrimeGrid's first sub-project was in cryptography as it participated in the RSA Factoring Challenge. While it no longer participates in the challenge, PrimeGrid continues to expand its functionality. Currently the project is running the following sub-projects:

- Twin Prime Search: searching for gigantic twin primes of the form $k*2^n + 1$ and $k*2^n - 1$.
- Cullen-Woodall Search: searching for mega primes of forms $n*2^n + 1$ and $n*2^n - 1$.
- 3*2^n-1 Search: searching for mega primes of the form $3*2^n - 1$.
- Prime Sierpinski Project: helping Prime Sierpinski Project solve the Prime Sierpinski Problem.

For more information, please visit PrimeGrid: http://www.primegrid.com

About 321 Search

321 Search began in February 2003 from a post by Paul Underwood seeking help from interested parties in a prime search attempt of the form 3*2^n-1. The initial goal was to build upon the completed work at http://www.prothsearch.net and extend the list of known primes to an exponent of 1 million. Interests gathered quickly and by the time they reached n=1 million, they had already pre-sieved further.

At that time, using George Woltman's libraries which implemented the newly discovered method of IBDWT (irrational base discrete weighted transform) multiplication of Colin Percival, Jean Penne's LLR (Lucas-Lehmer-Riesel) computer program gave them a rate boost of 400%. This together with computer hardware advances allowed them to reach tests at 1 million digits or exponent of about 3.3 million within a few years, with stated aim of eventually finding a mega-prime.

A note from Paul Underwood

In the early days, 321 Search relied on word of mouth at Yahoo groups to recruit people, but soon were kindly invited by Mike Vang a.k.a. "Xyzzy" to have their own sub forum at http://www.mersenneforum.org. There we congregated to discuss the search and to develop a few administration scripts for such things as participant point statistics and reservations. All this was manually maintained until we joined forces with PrimeGrid who had a proper server using BOINC (Berkeley Open Infrastructure for Network Computing.)

I see the future of the search for "321 primes" dependent on PrimeGrid, because the administration is relatively minimal and the double checking done by them highly limits computation errors, which increase with ever larger tests; plus it is easy for a contributor to link to and use the server. The

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original band of 321 Search will remain in existence for the foreseeable future too.

I cannot thank enough all of the people who have helped -- with discussion, administration and computer resources.

Paul Underwood

For more information, please visit 321 Search: http://www.mersenneforum.org/321search/

About BOINC

BOINC (Berkeley Open Infrastructure for Network Computing) 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.

For more information, please visit BOINC: http://boinc.berkeley.edu