

PrimeGrid's Generalized Cullen/Woodall Prime Search

On 2 September 2019, 03:39:59 UTC, PrimeGrid's Generalized Cullen/Woodall Prime Search found the largest known Generalized Cullen prime:

$$2805222 * 25^{2805222} + 1$$

*Generalized Cullen numbers are of the form: $n * b^n + 1$. Generalized Cullen numbers that are prime are called generalized Cullen primes. For more information, please see "Cullen prime" in The Prime Glossary (<https://primes.utm.edu/glossary/page.php?sort=Cullens>).*

*In order to improve the speed of the computation, $2805222 * 5^{5610444} + 1$ was the actual number tested. $2805222 * 5^{5610444} + 1$ is algebraically equivalent to $2805222 * 25^{2805222} + 1$*

The prime is 3,921,539 digits long and enters Chris Caldwell's "The Largest Known Primes Database" (<http://primes.utm.edu/primes>) ranked 1st for generalized Generalized Cullen primes and 21st overall.

Base 25 was one of 11 primeless Generalized Cullen bases for $b \leq 121$ that PrimeGrid is searching. The remaining bases are 13, 29, 47, 49, 55, 69, 73, 101, 109 & 121.

The discovery was made by Tom Greer of the United States using an Intel(R) Core(TM) i9-9900X CPU @ 3.50GHz with 32GB RAM, running Microsoft Windows 10 Professional x64 Edition. His computer took 3 hours and 23 minutes to complete the primality test using multithreaded LLR. Tom is a member of the Sicituradastra team.

The prime was verified on 3 September 2019 05:15:11 UTC by Tim Terry of the United States using an Intel(R) Core(TM) i7-7700K CPU @ 4.20GHz with 16GB RAM, running Microsoft Windows 10 Professional x64 Edition. This computer took about 24 hours 11 minutes to complete the primality test using multithreaded LLR. Tim is a member of the Aggie The Pew team.

The credits for the discovery are as follows:

1. Tom Greer (United States), discoverer
2. PrimeGrid, et al.
3. MultiSieve, sieve program developed by Mark Rodenkirch
4. gcwsieve, sieve program developed by Geoff Reynolds
5. LLR, primality program developed by Jean Penné

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

<https://primes.utm.edu/primes/page.php?id=129893>

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 to all the sievers who work behind the scenes to make a find like this possible.

PrimeGrid's Generalized Cullen/Woodall Prime Search will continue seeking primes for other primeless bases. 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 and currently administered by Iain Bethune, James Breslin, Scott Brown, Ulrich Fries, Michael Goetz, Roger Karpin, Rytis Slatkevičius, and Van Zimmerman.

PrimeGrid utilizes BOINC and PRPNet to search for primes with the primary goal of bringing 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, www, 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>