

# PrimeGrid's Generalized Cullen/Woodall Prime Search

On 24 Feb 2011, 17:27:31 UTC, PrimeGrid's PRPNet found the largest known generalized Woodall prime:

$$404882 \cdot 43^{404882} - 1$$

*Generalized Woodall numbers are of the form:  $n \cdot b^n - 1$ . Generalized Woodall numbers that are prime are called generalized Woodall primes. For more information, please see "Woodall prime" in The Prime Glossary (<http://primes.utm.edu/glossary>).*

The prime is 661,368 digits long and enters Chris Caldwell's "The Largest Known Primes Database" (<http://primes.utm.edu/primes>) ranked 1<sup>st</sup> for generalized Woodall primes and 71<sup>st</sup> overall. It is the largest non-base 2/non-generalized Fermat prime ever found.

The discovery was made by Ricky L. Hubbard of the United States using an AMD Athlon II X4 635 @ 2.90GHz with 8GB RAM, running Windows 7. This computer took about 4 hours and 15 minutes to complete the probable prime test using pfgw64. The same computer took a little over 30 hours 3 minutes to complete the primality test using pfgw64. Ricky is a member of the AMD Users Team.

The credits for the discovery are as follows:

1. Ricky L. Hubbard (United States), discoverer
2. PrimeGrid, et al.
3. MultiSieve, sieve program developed by Mark Rodenkirch
4. gcwsieve, sieve program developed by Geoff Reynolds
5. PFGW, primality program developed by Chris Nash & Jim Fougeron

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

<http://primes.utm.edu/primes/page.php?id=98862>

Base 43 was the lowest base without a generalized Woodall prime although it had been tested further than any other generalized base. Now it stands out with producing the largest known generalized Woodall prime.

Using a single PC would have taken years to find this prime. So this timely discovery would not have been possible without the 140 plus volunteers who contributed their spare CPU cycles. A special thanks to everyone who offered their advice and/or computing power to the search - especially Mark Rodenkirch, Steven Harvey, and Lennart Vogel who were instrumental in moving the project forward and to all the PRPNet'ers who contributed to this effort.

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>

# PrimeGrid's Generalized Cullen/Woodall Prime Search

## About PrimeGrid

PrimeGrid is a distributed computing project, developed by Rytis Slatkevičius, 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](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>