



BOINC-PROJECTS RUN BY RECHENKRAFT.NET E.V.

by

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Abstract

The German non-profit association RECHENKRAFT.NET e.V. does not only offer a well maintained wiki for information on distributed computing and an active forum for support and discussions about issues and advantages of distributed computing, but also runs two distributed computing projects. These are shortly described here. Both projects are run by volunteers and are funded by private donations.

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RNA World

The RNA WORLD project ² is developed by a RECHENKRAFT.NET work group which is supervised by DR. MICHAEL H.W. WEBER, chairman of RECHENKRAFT.NET E.V., who is currently located at the MASSACHUSETTS INSTITUTE OF TECHNOLOGY (MIT) in Cambridge/USA. This distributed computing system represents an assembly of different bioinformatic tools designed to identify non-coding RNAs and to analyse their distribution across species. It will be further extended to also handle RNA molecular dynamics simulations, RNA structure prediction and a number of other applications relevant to RNA research.



Since its public launch in February 2010 and selected as a challenging proof of principle, the core application of RNA WORLD is *Infernal* ³, a complex, computationally demanding, command-line-based software suite originally developed in the work group of SEAN EDDY ⁴ that was designed for the identification of homologous RNA families. On top of its systematic employment to identify ncRNAs and thereby generate novel biological information, the RNA WORLD development team has produced a number of useful add-on tools that significantly enhance the usability and the breadth of applicability of *Infernal*.

The aim of the project is to generally foster RNA research and to also invite international research groups to carry out collaborative research using the RNA WORLD infrastructure. The developers are currently working on a web-browser-based user interface enabling volunteers, scientists and the interested public equally to freely browse and use the results. More details on the scientific objectives can be found in the wiki of the RNA WORLD project based at RECHENKRAFT.NET E.V. ⁵.

Currently, RNA WORLD offers applications for 32bit and 64bit Windows and Linux and 32bit OS X ⁶ and has access to over 12,500 computers of almost 5,000 volunteers offering a theoretical peak computing power of 27 Tera FLOPS ⁷ (as of 2011-07-25).

Yoyo@Home

Initially in 2006, YOYO@HOME ⁸ was a project set up by UWE BECKERT (aka YOYO ⁹) just for getting started with the server-side of BOINC. Built upon the BOINC server VM by Christian Beer, he launched the project on his 1.6GHz, 500MB laptop with the basic uppercase application.



Using the standard BOINC wrapper he integrated the client of the distributed.net (DNET ¹⁰) project into his BOINC server and kept the server running for a couple of days on his private laptop in the VM serving a BOINC project for crunching OGR through BOINC.

Finally in summer of 2007, he moved the BOINC server from his private laptop onto the main server of RECHENKRAFT.NET, which was providing the homepage (Wiki) and forum.

Unfortunately, a race ¹¹ between the two teams SETI.GERMANY ¹² and ALLIANCE FRANCOPHONE ¹³ forced Uwe and RECHENKRAFT.NET to move YOYO@HOME to its own server. That was in January and February 2008.

During the following months and years, Uwe and others of RECHENKRAFT.NET built wrappers for other distributed computing projects, which were not available through the BOINC framework. These were *Muon* ¹⁴ and *Evolution@Home* ¹⁵.

With the additional subprojects ¹⁶ and an increasing number of participants, the interest in the computing power of YOYO@HOME was recognized by some mathematicians.

One of them suggested integrating his program for elliptic curve factorisation (application: *ECM*), where the results can be used by other distributed computing projects searching for new prime factors. Last year, another mathematical project, *EulerNet*, got integrated searching for *Euler solutions*. On 26th July 2011 the *Euler* project finished and produced over 1.8 million results consuming a total of 704 Tera FLOP.

From August 2011 on, an other mathematical project was integrated trying to prove — or disprove — the *Harmonious Tree Conjecture* as proposed by GRAHAM and SLOANE in 1980.

Currently, YOYO@HOME comprises six different applications for ten different systems ¹⁷, such as Windows 32 and 64bit, Linux 32 and 64bit, OS X, Solaris, Intel or AMD CPUs and even for SONY's PLAYSTATION 3. All in all there are over 10,000 participants (approx. 2,000 active) with over 33,000 individual computers (approx. 10,000 active) connected to the YOYO@HOME project offering approximately 9.2 Tera FLOPS ¹⁸ (as of 2011-05-30).

Notes

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²http://www.rechenkraft.net/wiki/index.php?title=RNA_World/en

³<http://infernial.janelia.org/>

⁴<http://selab.janelia.org/>

⁵http://www.rechenkraft.net/wiki/index.php?title=RNA_World/Scientific_objectives/en

⁶<http://www.rnaworld.de/rnaworld/apps.php>

⁷http://boincstats.com/stats/project_graph.php?pr=rnaworld

⁸<http://rechenkraft.net/yoyo/>

⁹<http://www.rechenkraft.net/wiki/index.php?title=Benutzer:Yoyo>

¹⁰http://www.distributed.net/Main_Page

¹¹<http://www.rechenkraft.net/phpBB/viewtopic.php?p=84992#p84992>

¹²<http://www.seti-germany.de/>

¹³<http://www.boinc-af.org/>

¹⁴<http://www.stephenbrooks.org/muon1/>

¹⁵<http://www.evolutionary-research.net/>

¹⁶http://www.rechenkraft.net/wiki/index.php?title=Yoyo%40home_en

¹⁷<http://www.rechenkraft.net/yoyo/apps.php>

¹⁸http://boincstats.com/stats/project_graph.php?pr=yoyo