

Developing a System for Number Theory by Script Language

— Announcement of the Release of NZMATH 0.1.1 —

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Introduction

Our purpose is to report on the development of a new system NZMATH for number theory written by script language Python. The name NZMATH depends on New Zi MATH = New SIMATH, Number Zahlen or Nippon Zimmer, and MATHematics.

Since 2002, TMU took over SIMATH from Saarlandes. There may arise a natural question that we are irresponsible for SIMATH to start a new system. Continuing the maintainance of SIMATH after the succession, we have implemented it on 64 bit platforms and packaged the CEM, a method of computing units and the class numbers, on it.

Throughout this work, however, we have observed several problems to proceed with our further development of SIMATH. We only list up the main ones: (1) It is necessary to take care of memory management by ourselves for any system written by C; indeed SIMATH has a special list management, and it obliges us to work with complicated source cord related to garbage collection GC. (2) We must prepare multiple precision MP packages for any system written by C; indeed SIMATH has three different types of MP integers, two of them are by other parties, and one of these two is not known whether it is still alive or not. (3) The license of SIMATH is shared with Siemens, and there is no financial support already, but it still restricts us. (4) Neither redistribution of SIMATH even for scientific use nor its free commercial use is permitted. (5) Many users are utilizing SIMATH by its interpreter `simcalc`, but their experience will not directly reflect to the system library as they should learn another language C. (6) Maintaining interpreter `simcalc` requires developers to do additional tasks unnecessary for the original purpose of realizing algorithms on SIMATH.

By these reasons, we decided to maintain and support SIMATH as it is. The system is still widely used and we are supporting it. Our main support at

present is on installation of the system to several machines and on maintaining its interpreter `simcalc`.

Script Language

We have to write NZMATH by the programming language having the following features: (1) with GC and MP in advance; (2) object oriented for rich data types; (3) script language to develop program library and interactive calculator together; (4) easily understandable widely internationally used to put weight on the speed of development than on that of computation; (5) possible to up the speed of run time and to link with other systems. So far, the language with all these features is Python or Ruby, and we write NZMATH by Python as it is much more international. The most important aim of our system NZMATH is to fill the gap between users and developers. Therefore we are interested in commonly used stable development technique of collaboration through internet, and hence we shall apply the current version system CVS to accomplish that aim. Proper license of NZMATH is, of course, important so that both high performance and convenience for application are satisfied. For such purposes, it is essential to make source code open but not to put so strict restriction on distribution or commercial use. We employ the BSD license from this point of view.

Current Release and Plans

We have released Version 0.0.0 on 28 Nov. 2003, Version 0.0.1 on 2 Dec. 2003, Version 0.1.0 on 26 Mar. 2004, and Version 0.1.1 on 13 May 2004, which is still an α version!

Our plans of NZMATH is as follows: For the moment, we install fundamental elementary algorithms for number theory to release a β version in 2004. For a short range, we install basic algorithms of number fields, those of elliptic curves, and sophisticated algorithms including those of current SIMATH. For a middle range, we will organize a widely spread group of users=developers by refining interface for users with manual for users=developers. For a long range, we must improve the run time and link to other systems.

Try NZMATH accessing <http://tnt.math.metro-u.ac.jp/nzmeth/>.

Join NZMATH sending "subscribe" by email to

`nzmeth-user-request@tnt.math.metro-u.ac.jp`.

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