Developing a System for Number Theory by Script Language
— Announcement of the Release of NZMATH 0.1.1 —

NAKAMULA, Ken and MATSUI, Tetsushi
Tokyo Metropolitan University (TMU)

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GERMAN TRAINS ARE THE BEST ALL OVER THE WORLD!!

Abstract

Neither Mathematics Nor Algorithms
Report of Development of a New System `NZMATH` for Number Theory
Call for Discussion on Our Policy and for Joining the Development

- What We Learned from `SIMATH`
- Why We Employed the Script Language `Python`
- Who Are the Current Members of Development Group
- Present Status and Future Aim
- How to Participate in `NZMATH`

Might State Frank Opinion, Not Denying `SIMATH` or Other Systems
Hope to Watch Warmly and Severely This Baby by New Trial

Keywords

`SIMATH`, script language, `Python`, `NZMATH`, CVS, the BSD license

Contents

1. Motivation

Irresponsible for SIMATH?

Since 2002, TMU took over SIMATH from Saarlandes.

- implemented on 64 bit platforms
- packaged the CEM

Development Environment

- self memory management
  $\Longrightarrow$ complicated source cord
- three multiple precision integers
  two of them are by other parties
  one of the two is not known whether alive or not

License Problem

- license is shared with Siemens (without financial support since 2003)
- no redistribution and no commercial use

Further development may be restricted by this license.

Library and Interpreter by Distinct Languages

- users experience by interpreter cannot be reflected to the system
- maintaining interpreter requires additional task for developers

$\Longrightarrow$ **maintain and support as it is**

- still running and used
- main support is on installation and on interpreter

2. Script Language

Policy of `NZMATH`

- language with garbage collection and multiple precision arithmetic in advance
- object oriented language for rich data types
- script language to develop program library and interactive calculator together
- weight is on the speed of development than on that of computation

  $\Longrightarrow$ easy to understand and internationally widely used
- possible to up the speed of run time and to link with other systems

$\Longleftrightarrow$ Language is `Python` or `Ruby` $\Longrightarrow$ `Python`.

- commonly used stable development technique

  of

  collaboration through internet

  $\Longrightarrow$ employ CVS

- proper license for

  high performance

  and

  convenience of application

  $\Longrightarrow$ source cord open but not so strict

  $\Longrightarrow$ employ the BSD license

3. Developers and Users

Difficulties

- restricted ability of developers ($5 + 5$ students)
- big gap between developers and users
- continuous group of development

  $\Longrightarrow$ successors
- financial support without restriction

  $\Longrightarrow$ NTT

Critical is a users-group reflecting experience to the system

First use for checking already computed data

4. Current Release and Plans

Version 0.0.0 on 28 Nov. 2003 Version 0.0.1 on 2 Dec. 2003
Version 0.1.0 26 on Mar. 2004 Version 0.1.1 on 13 May 2004

Version 0.1.1 — Still α version!

`bigrandom`	big random numbers
`euler`	the Euler ϕ and the Möbius μ functions
`factor`	prime factorization in $\mathbb{Z}$
`gcd`	the GCD of integers
`imaginary`	complex numbers
`integerResidueClass`	residue classes $\mathbb{Z}/m$
`lattice`	lattices
`matrix`	matrices
`polynomial`	polynomials
`prime`	primality test
`rational`	rational numbers
`rationalFunction`	rational functions
`real`	real numbers
`ring`	rings
`vector`	vectors

Plans

For the Moment

fundamental elementary algorithms
$\Longrightarrow$ release a β version in 2004

For a Short Range

fundamental algorithms of number fields and elliptic curves
$\Longrightarrow$ more sophisticated algorithms including those of current `SIMATH`

For a Middle Range

organize a widely spread users=developers-group
$\Longrightarrow$ refine interface for users with manual for users and developers

For a Long Range

improve the run time and link to other systems

5. Call for CVS commitment

Why NZMATH?

New	Zi	MATH
Number	Zahlen	
Nippon	Zimmer	

Try

Access

`http://tnt.math.metro-u.ac.jp/nzmath/`.

Join

Send "subscribe" by email to

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

Ask

Send email to

`nzmath@tnt.math.metro-u.ac.jp`.