Web-SynDic

Web System for Demonstrating the Syntactic Algorithms for Solving Linear Equations in Nonnegative Integers (Nonnegative Linear Diophantine Equations)

Requirements Specification
Iteration 2.0 (started August 2004)

Department of Computer Science, Petrozavodsk State University, Russia

25th November 2004

Contents

1 Introduction

This phase of the Web-SynDic project is final corrections before publication to the Internet. It was started on August 2004. The list of used terms listed in Section 2. The collection of user requirements introduced in Section 3. The project plan is presented in Section 4.

2 Glossary

This section describes used terms.

Real work time — elapsed real (wall clock) time used by the process.

CPU work time — total number of CPU-jiffies (0.01sec) used by the system on behalf of the process (in kernel mode).

user time — The number of jiffies that this process has been scheduled in user mode.

system time — The number of jiffies that this process has been scheduled in kernel mode.

Process code size — memory space which contains code instructions.

Process data size — memory space which contains program data.

Process stack size — memory space which contains program size.

Process virtual size — sum of program code size, program data size and program stack size.

Library size — memory space which contains libraries.

Resident Set Size (RSS) — physical memory that is always resident.

3 Collection of the User Requirements

This collection based on the User Requirements proposed by the Customer on 01.08.04.

3.1 Primary requirements

The order of the primary requirements corresponds to Customer's priorities.

3.1.1 External algorithms (A.2)

Short description Each external algorithm should have CPU work time restrictions. Also measuring algorithms must be resource-saving and accurate.

Current situation Only solvers support CPU work time restrictions. The measuring algorithms have been changed many times — no stable design and implementation.

Disadvantages In case with wrong generating algorithms the Web-SynDic system may hung. Measuring algorithms use a lot of resources and sometime give incorrect results.

Requirements to elimination of defects

- Add CPU work time restrictions for each external algorithm (both solvers and generators).

- Check the measuring algorithms with independent measuring programs and implement more resource-saving technology.

3.1.2 User Limits management (A.1)

Short description The User Interface should allow a user to set minimum and maximum limits, explicit limits for CPU work time of any external algorithm and additional limits for ANLDE generators.

Current situation In the current version user can only set maximum bounds for values, the same values of limits are used for solving and generating ANLDE systems.

Disadvantages In the current version the User Limits management UI is not enough flexible and not very clear for unexperienced users.

Requirements for elimination of defects

- Separate user limits for solver and generator parameters.

- Do not show the least useful values until user wants to change them.

- Implement minimum limits for some values (analyze if there are values which require minimum limits).

- Add a limit for ANLDE generators CPU work time.

Realization of the requirement HTML forms, Java Server Pages and Servlets.

3.1.3 Alpha-testing (A.16)

Short description Alpha-testing should conduct after implementation phase.

Current situation The first alpha-testing was conduct on February, 2004.

Disadvantages The current version of the Web-SynDic system have many changes and we need to check the system.

Requirements to elimination of defects   Conduct final alpha-testing with the following parameters:

— 8-10 external testers;

— 3 hours for each external tester;

— stress testing for spoolers;

3.1.4   User passwords (A.11)

Short description   User passwords should be encrypted before storing them in the data store. User password should be confirmed if password is changed or user profile is deleted.

Current situation   In the current version of the Web-Syndic system passwords are not encrypted and user profile deleting and password changing are not confirmed.

Disadvantages   It is not safe to store password in the Data store as is without encryption and manipulate password and profile without confirming for security reasons.

Requirements to elimination of defects
- Each user password should be stored in the Data store in encrypted representation.
- Encryption and decryption functions should be reliable and should not take much processing time.
- User password should be verified before any password changing and profile deleting.

Realization of the requirement   Standard Java encryption tools (md5 algorithm).

3.1.5   Check solutions (A.9)

Short description   Produced solutions should be checked. Each found solution should be a correct ANLDE system solution. Results of different algorithms must not conflict with each other.

Current situation   There is a function that checks found solutions for a conflict with other found solutions. Other verifications do not implemented.

Disadvantages   The Web-SynDic system does not check that found solution is correct. Verification of results for different solvers is implemented a very simple way.

Requirements to elimination of defects
- Add function to check that found solution be an ANLDE system solution.
- Test and improve the function to verify results of different algorithms.

3.1.6   Server load information (A.3)

Short description   The number of tasks in the generator and solver spoolers queues and number of users currently working in the web-system should be available for a user. Also Customer requires to set maximum tasks to 10.

Current situation   In the current version the information about the load of spoolers and number of users is not available.

Disadvantages   User can not estimate the load of the web-system.

Requirements for elimination of defects
- Display the number of tasks in the 2 spoolers.
- Display the number of users working in the system (the number of opened sessions).
- Set maximum tasks in spooler to default value 10.

Realization of the requirement   HTML, Java Server Pages.

3.1.7   User manual (A.15)

Short description   New version of the user manual containing detailed and structured information on installing, configuring, and using the Web-SynDic system should be prepared.

Current situation   In the current version the user manual contains reference manual, administrator manual, and installation instructions.

Disadvantages   In the current version the user manual is not enough structured and is not very clear for unexperienced users.

Requirements for elimination of defects

- Design new structure of the document.

- Add step-by-step basic usage tutorials.

- Add detailed information on abbreviations and terms.

- Add more information on installing and configuring the system.

3.1.8   Documentation (A.17)

Short description   New version of project schedule should be prepared, all English documentation should be checked and new version of working hours should be started.

Current situation   We have old schedule of November, 2003. English documentation has been written but not checked. Current format of working hours does not flexible.

Disadvantages   We start new iteration and project deadline changed. After deadline English documentation will be published and these documentation may contain some mistakes.

Requirements to elimination of defects

- prepare new version of project schedule.

- Check all documentation.

- Start new version of working hours.

3.1.9   Web-site (A.18)

Short description   Web-system documentation (including some project documentation, presentations, articles, etc.) should be available on a web-site.

Current situation   Help system of the Web-SynDic contains some articles about ANLDE theory. No other articles, presentation are available on the Web-SynDic system.

Disadvantages   Not all necessary documents are available.

Requirements to elimination of defects

- The Web-SynDic system should have a web-site with all necessary corresponding documentation.

- Web-site should have a link on the Web-SynDic system.

- Structure:

  - Project documentation
  - User manual
  - Publications

- Web-resource should have a link on the Web-SynDic system (running server).

Realization of the requirement   Standard web-site.

3.2   Secondary requirements

The order of the primary requirements corresponds to Customer's priorities.

3.2.1   User interface (B.12)

a) Color highlighting
   Current state: at present the Web-SynDic system supports poor color highlighting (e.g. error messages).
   Current system shortcomings: produced report pages do not emphasize extract main points.
   Requirements for elimination of defects: make color highlighting on pages.

3.2.2   Message unification (B.14)

a) delete duplicated messages
   Current state: some messages have duplicates.
   Current system shortcomings: these messages may conflict with each other.
   Requirements for elimination of defects: delete duplicated messages.

b) Support of message standards
   Current state: the Web-Syndic system have several types of messages.
   Current system shortcomings: these messages may conflict with each other.
   Requirements for elimination of defects: support of message standards.

c) Unified technology for message typing

    Current state: the Web-Syndic system have several functions for typing messages.

    Current system shortcomings: these functions may conflict with each other.

    Requirements for elimination of defects: Use unified technology for message typing.

3.2.3   Activity statistics (B.8)

a) Additional metrics for activity statistics

    Current state: at present the Web-SynDic system supports only basic metrics of activity statistics (?!?!?!   what metrics - enumerate ?!?!?!).

    Current system shortcomings: basic metrics of activity statistics can not show detailed information about Web-SynDic system usage.

    Requirements for elimination of defects: add new activity statistics metrics.

3.2.4   Monitoring and management (B.3)

a) processes monitoring and management

    Current state: at present the Web-SynDic system supports only debug monitoring.

    Current system shortcomings: Administrator can not manage processes, she/he can only watch debug messages.

    Requirements for elimination of defects: make a possibility to control and manage processes.

b) tasks monitoring and management

    Current state: at present the Web-SynDic system supports only debug monitoring.

    Current system shortcomings: Administrator can not manage tasks, she/he can only watch debug messages.

    Requirements for elimination of defects: make a possibility to control and manage tasks.

c) User tasks management

    Current state: at present the Web-SynDic system supports only debug monitoring.

    Current system shortcomings: User can not manage own tasks, she/he can only watch process messages.

    Requirements for elimination of defects: Add possibility to manage user tasks (e.g. Stop current task).

3.2.5   waiting window (B.19)

a) refresh "waiting" window when solving process long

    Current state: "waiting" window does not refresh.

    Current system shortcomings: Some browsers does not support long load.

    Requirements for elimination of defects: refresh "waiting" window when solving process long.

3.2.6   statistical info (B.20)

a) skip empty elements in statistical info

    Current state: the Web-SynDic system does not check that elements in statistical info are not empty.

    Current system shortcomings: some elements are empty.

    Requirements for elimination of defects: skip empty elements in statistical info.

3.3   Future development

The Customer has not prioritized these requirements yet. Thus their order is random.

3.3.1   User limits interface (C.1)

a) If process exceeds a limit, then the user gets warning and process continues the work. It must not be for all limits, but for some of them.

3.3.2   External algorithms (C.2)

a) multiple solver runs for a given ANLDE system (set) and corresponding statistical estimation (average, etc.);

b) Port measuring algorithms to OS Windows family;

c) combine parallel and sequential approach for spooler tasks;

d) generate systems $n \times n$ and using generated basis for comparison.

e) Fix problem when generator changes status to "sleep".

3.3.3   Server load information (C.3)

Add tools for Administrator to control and manage server workload.

3.3.4   Multilingual user interface (C.4)

The Web-SynDic system must support English and Russian languages.

3.3.5   Add new algorithms (C.5)

a) Solvers (e.g. GLPK, BonzaiG).

b) Generators. Also take into account the feature of a generator to generate not alone ANLDE system, but both system and its basis.

3.3.6   Solving a set of ANLDE systems (C.6)

More detailed (statistical) information about solving a set of ANLDE systems:

a) characteristics for a set of ANLDE systems

b) characteristics for resource usage

c) characteristics for found solutions

d) Hilbert basis for each ANLDE system in the set, if needed

3.3.7   NLDE systems (C.7)

Support NLDE system format and auto conversion it to ANLDE system. At least for some classes of NLDE systems.

3.3.8   Activity statistics (C.8)

The problem that arises when Administrator session is working on and current time period has been changed (crossing month border).

3.3.9   Check found solutions (C.9)

a) they are basis (minimal) solutions

3.3.10   Admin management improvement (C.10)

a) list of all users and links to the corresponding info page for each user;

b) storing profiles even for deleted users (archive)

c) "Admin" group support (privilege users)

3.3.11   Code unification (C.13)

a) delete repeats in the code

b) support the code standards

3.3.12   Documentation (C.17)

a) translate documentation to the Russian language (educational purpose).

3.3.13   User groups (C.21)

Implement user groups for Web-SynDic system. Develop user interface for group management. Add possibility to set algorithms configuration constraints separately for each group.

3.3.14   Linux version compatibility (C.22)

At this moment solvers are working correctly on Linux version 2.4.21. They do not work on Linux version 2.6.9.

3.3.15   Jakarta Tomcat 5.0 compatibility (C.23)

At this moments sending notes subsystem is not working correctly under Tomcat 5.0. It ignores configuration of ``mail/Session'' JNDI resource in `${TOMCAT_HOME}/conf/server.xml` and uses ``localhost'' as SMTP server by default.

3.3.16   Algorithms Configuration (C.24)

Add possibility for user to reset algorithm configuration parameters to default values.

3.3.17   Tips (C.25)

Add tips for abbreviations and terms.

3.3.18   Browsers compatibility issues (C.26)

Describe the different browsers compatibility issues in the User Manual document.

3.3.19   Using the browser "Back" button (C.27)

Add to FAQ information on using browser "Back" button when processing is not completed.

4   Project plan

Time	Phase
03–09.08	requirements analysis, design
09–19.08	design, implementation
16–23.08	implementation, testing
23–30.08	testing, alpha-testing
23.08–17.10	documentation, web cite
23.08–17.10	Publication plan
07–25.10	User manual (version 2)
18-24.10	Customer's inspection
25.10-01.11	User manual (version 3)
01.11-04.11	User manual (next), Project metrics (draft)
28.10–01.11	final testing
01.11	Final alpha testing
05.11	Freeze source code
14.11	Use manual (final), Project Metrics (final)
14–15.11	Publication
15.11	delivery to Customer

5   Publication plan

The Web-Syndic publication consists of the following phases:

Time	Phase
28–14.10	Deployment
14–15.11	Publication
11–31.11	Monitoring

Location

The Web-SynDic server location is `http://zeta.cs.karelia.ru/Web-SynDic` (if Tomcat will not installed as apache module, then `http://zeta.cs.karelia.ru:8080/Web-SynDic`), documentation location is `http://zeta.cs.karelia.ru/Web-SynDic`.

Web site maintainer adds corresponded links from main page of Computer Science department site `http://www.cs.karelia.ru`.

Web-SynDic server

Manager selects Web-SynDic Administrator (Kulakov K.). Web-SynDic Administrator copies

latest version of Web-SynDic server to the corresponded location and check links. Testers check links correctively and common server work.

During publication phase Customer and Manager sends e-mails and registrate Web-SynDic as a new network service.

After publication Administrator is keeping the Web-SynDic under observation and deliver common statistics to the Customer.

Web-SynDic site

Web-SynDic Administrator copies latest Web site files to the corresponded location, checks links and adds last versions of Web-SynDic materials.

Testers check links correctively and common server work.

After publication Administrator update news section and keeping the Web-SynDic site under observation.