

Platform for Developing Software Effectively

🔗 Development support, Platform, User interface, Data management, Algorithm incorporation

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Abstract

We are researching technology in order to develop products that reduce work load by the use of a computer. Meidensha Corporation (“MEIDEN”) embarked on researching data input methods as a software development platform under which tables and diagrams without numerical input data are generated. We applied this platform to the software development support systems or tools for various fields.

This platform architecture consists of three layers, the user interface layer, data management layer, and the algorithm incorporation layer. Each system is developed by only adding unique elements of the required specification to the platform, which are what kind of table or diagram needs to be drawn and how each of such data should be interpreted.

The basic concept for this platform is to accelerate the development speed of the software development support systems.

1. Preface

With the progress of computers and network performance, software development environments are also evolving. It has recently become common to develop software products by using a software models' visual combination without writing actual program. In the field of product development, there are many market demands such as advanced and complicated functions or shorter production time. In order to meet such challenges, Meidensha Corporation (“MEIDEN”) is developing various software development support systems or tools.

This paper introduces a platform that enables the development of such software development support systems or tools in a shorter amount of time, and shows some examples of its practical applications.

2. Basic Configuration of the Platform

Fig. 1 shows the basic configuration of the platform architecture. This platform is composed of three layers as shown below.

(1) User interface layer

Making screens and screen components, and property settings, keyboard and mouse operation are possible in this layer.

(2) Data management layer

This layer is in charge of data file saving and data retrieval, undo management, redo management and data consistency checks.

(3) Algorithm incorporation layer

This layer is used for the active use of data by

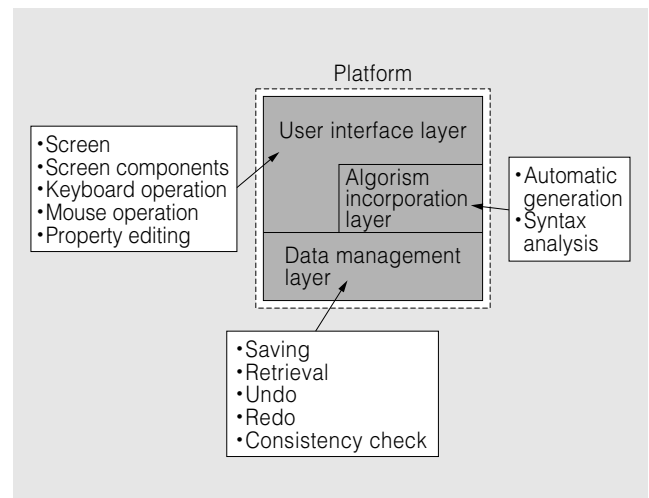


Fig. 1 Basic Configuration of the Platform

The platform is composed of three layers (user interface layer, data management layer, and algorithm incorporation layer). These layers are interlinked with each other to perform the basic operation of the software development support system or tool.

automatic data generation from specific data.

In the data input method of software development support systems or tools, adding each layer component could be done with the required specifications particular to the software development support system or tool.

3. Features of the Platform Architecture

The major features of the platform architecture are specified below:

3.1 Various Screen Configurations

Multiple screen can be shown side by side or

shown individually. When an active screen is put together with another screen, it can be displayed in a combined manner through the automatic adjustment of the screen position and size. The screen configuration can be changed at operator's will. In addition, enlargement and reduction of a screen, printing, and grid indication are also possible.

At the startup of a software development supporting system, the screen of a previous operation can be easily restored. In this case of prior system status, it is possible to confirm the image restoring condition by the screen.

3.2 Editing Functions for Screen Component

By the simple registering of an operation like movement, size changing, and rotation in the screen component, it is possible to edit these components.

For trees and tables, screen components which are structurally complicated and difficult, a display can be produced by simply linking up the displaying data. A table-applied property sheet (a software component to allow the editing of data parameter) is also available.

3.3 Application for Time-Series Management Function and Dispersed System Constructions

The log of operation, editing of tables and diagrams (screen and screen components) are managed as Time-Series data. By forwarding and returning operation logs, it can easily perform the Undo and Redo operations.

When developed as a team, merging tables and diagrams produced by each member of development team while maintaining consistency.

3.4 Import and Export

By registering (exporting) tables and diagrams produced by a development team into a library, the same library can be reused (imported) by another development team by retrieving the data.

3.5 Version-Up Capability

Update of data file format caused by a change of data structure (addition and deletion of parameter window) can be made automatically by simply registering the change log.

3.6 Automatic Data Generation

When a typical data generation procedure (JavaScript) is registered, one can generate data from other data. For example, it can automatically generate a property sheet which displays and sets data parameters from the data structure.

3.7 Syntax Analysis

It can perform the syntax analysis for programs (C language or Java language). For example, using the result of syntax analysis, programs can be converted into design information and we can confirm behavior by simulation.

3.8 High Productivity

As described later in the examples of applications, we realized the development of various software

development systems or tools in 2-3 times higher productivity levels than the previous ones.

4. Examples of Applications

We introduce some examples of software development support systems or tools created by using this platform. By using such systems or tools, the speed of software development for each specific product was shortened by half the time than the former.

4.1 Software Development Support System for Systems (Fig. 2)

For the development of monitoring and control systems or development support systems, a program is automatically generated when we input design using UML (United Modeling Language), an analytical design description method of software. This system meets the requirement for a software development organization involving two or more individuals.

4.2 Software Development Support System for Embedded System (Fig. 3)

For the development of inverter units, inputting program design for control software can simulate the inverter control and generate control programs automatically. This system meets the requirements for a development organization involving two or more people. It also meets the quality control level required of our company.

4.3 Visualization Data Generation Tool for Electric Power System Drawing (Fig. 4)

In the monitoring system for power substations such as a photovoltaic power generator or wind-turbine power generator, when visualization is designed for monitoring of facility layout drawing or electric power system drawing, and etc., the system can automatically generate the property data in the monitoring screen. Using this tool can curtail man hours by more than 80%.

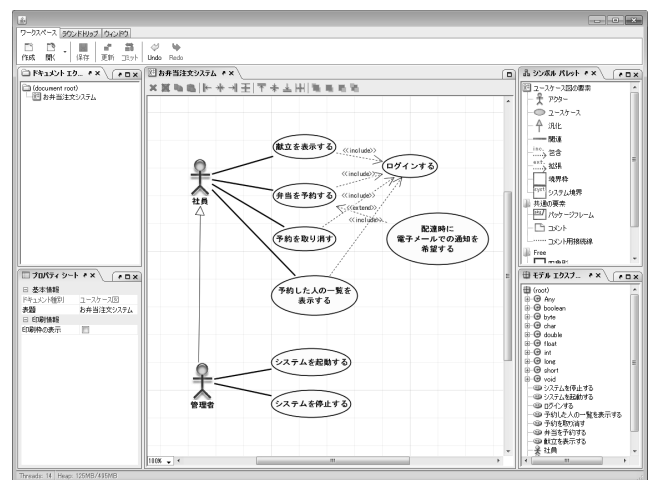


Fig. 2 Software Development Support System for Systems

The system software development support system is a system that performs speedy software development for supervisory control systems or software development support systems.

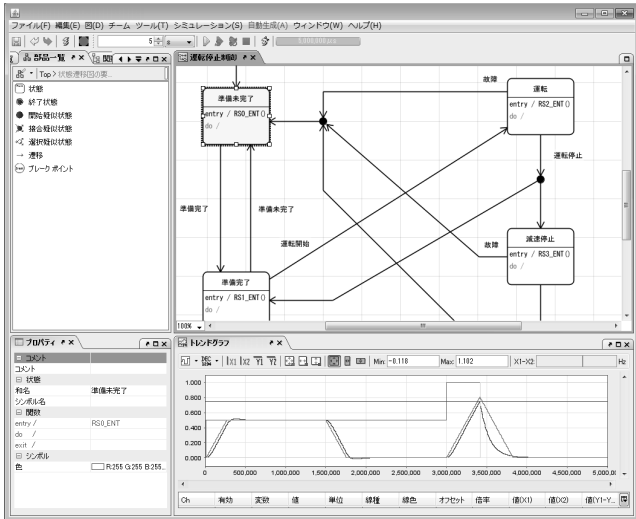


Fig. 3 Software Development Support System for Embedded System

The software development support system for embedded system is used to realize software development for inverters or power converters in a short amount of time.

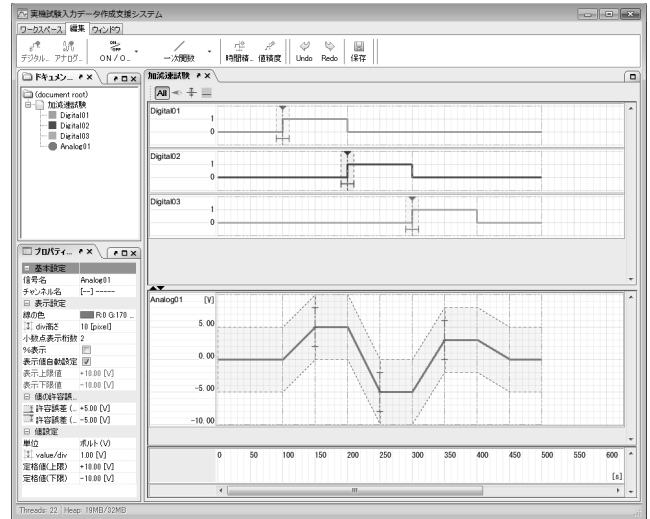


Fig. 5 I/O Pattern Generation Tool for PCB Assembly Testing

The I/O pattern generation tool for PCB testing is a tool that easily generates the I/O parameter data to be used for actual PCB testing.

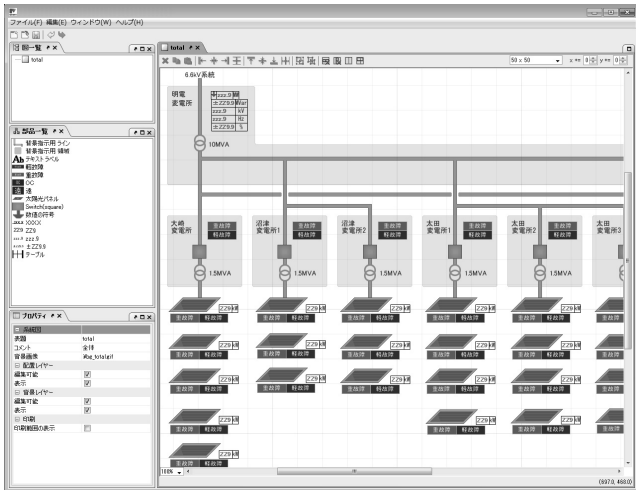


Fig. 4 Visualization Data Generation Tool for Electric Power System Drawing

The visualization data generation support tool for electric power system drawing is a support tool for generating visualization for a renewable energy power network.

4.4 I/O Pattern Generation Tool for Printed Circuit Board (PCB) Assembly Testing (Fig. 5)

By putting I/O data for actual PCB assembly testing into high visibility, we efficiently generate the parameter testing data. By using this approach, an automated test supporting tool (made by Meiden System Solutions Corporation) can be easily used by clarifying the I/O data of the printed circuit board assembly for actual machine examinations, and effectively making test data. By importing such generated testing data into the software development support system for embedded system discussed above, it becomes possible to carry out operation checks by simulation prior to the generation of actual PCBs assembly.

5. Postscript

This paper introduces a software development platform that actively uses the established data of tables and diagrams in visualizations and generates parameter data. Going forward, we would like to expand the application range and accelerate the development of software products.

- All product and company names mentioned in this paper are the trademarks and/or service marks of their respective owners.