Research and Implementation of Machine Programming Based on Agile Thinking

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Abstract: With the rapid development of information, communication, network and computer, the field, depth and breadth of computer applications are also rapidly expanding. The traditional production methods, development techniques and development tools of software development are no longer suitable for the system software development with larger and larger scale and more complex structure. Facing the fast changing demand, how to develop software quickly and quickly has become an urgent problem. This paper takes the agile development methodology as the support point and the core idea, puts forward to adopt the agile development thought as the core, take IDE as the tool, take machine programming as the core technology, carries on the research to the agile thinking machine programming technology, carries on the development in Visual Studio, finally, realizes carries on the programming with the machine.

1. Introduction

The software crisis that broke out in the mid-1960s led to the birth of "software engineering", and the subsequent emergence of various new software development methods promoted the rapid development of the software industry time and time again. In the late 1990s, software development showed new characteristics, that is, rapid software development in the process of constant changes in demand and technology. In this context, the software industry draws on the idea of "agile manufacturing" in the manufacturing industry, and gradually forms a new development model-Agile software development. Agile software development is a lightweight development method that takes people as the core, iterative, and gradual progress. Compared with traditional software development methods, it has the following advantages: 1) Better adaptability to changes in requirements; 2) Pay attention to the initiative and creativity of software developers, emphasize the communication and cooperation between developers, and more humanization; 3) Improve the software code quality, reduce development costs and time.

Agile development practices have been widely used abroad, including Extreme Programming (xp), SCRUM, Crystal, FDD (Feature Driven Development), ADP (Adaptive software Development), etc. Among them, Extreme Programming (xp) is the most representative and most eye-catching one. It is a lightweight software development method, suitable for small and medium-sized teams to develop software with fuzzy or changeable needs. It can be seen that there are already a large number of agile applications abroad. Software development ideas are very advanced.

The domestic market and development environment are still far from foreign countries. Although the "Agile China Technology Conference" has been held three times, the domestic software
engineering field still has very limited understanding of agile development, and many teams want to try this development method, there are relatively fewer benefits that can be applied to the development process of software projects.

In addition, agile software development still faces the problem of lack of excellent auxiliary tools. For example, an important link in agile software development is refactored one by one. One of its major obstacles is the lack of tools. Although there are many techniques in refactoring, many methods are very mature and have fixed implementation steps. It is very boring to refactor various codes according to the writing steps manually, but also need to be very careful, otherwise it is very easy to bring new bugs. For this reason, although many developers know that refactoring is very important for maintaining software quality, they are really unwilling to carry out such a fun and time-consuming manual refactoring.

And now, with the development of concepts such as cloud computing, the evolution of IDEs is coming. A team of computer scientists at the University of London is developing this technology. They not only need to get rid of inefficiency in programming, but also change the role of most programmers. Queue Software is a company at the forefront of "code writing" technology. Queue is headquartered in Raleigh, North Carolina, USA. In January of this year, Queue launched Dropsource, an automated code writing platform. Dropsource can write programs according to the purpose and function input by the user. When writing programs, programmers will consider conventional solutions. This system can choose the best design and development plan from it. Another outstanding player is Bubble.is, a New York company. Bubble.is provides a visual program development interface that supports drag and drop operations. Similarly, Bubble.is requires no programming knowledge.

From the current point of view, the expansionary growth of software scale and the gradual increase of R&D costs are an indisputable fact, and the situation is increasing year by year. The ability to reduce costs is waiting to be seen from both customers and software developers. This article proposes to incorporate agile ideas into machine programming.

The entire agile development methodology is embodied in the entire development process, and agile development management is introduced. The entire process from modeling design, R&D, testing, and operation and maintenance is completed under the guidance and influence of the agile methodology. The tested system has been It can quickly generate most of the source code of a software system through modeling technology. At the same time, the code quality, coding style consistency, code security, code algorithm performance, etc. are generated by the model engine, which can reduce R&D costs and development efficiency.

2. Material and Methods

2.1. IDE framework program
The IDE framework creates projects and manages various design model documents in the project, and can create and design eight design models. At the same time, based on the design models, one-click source code can be generated directly through machine programming and the entire visualization. During the design process, you can set the properties of any of the data controls and layout controls. The property settings should be simple and straightforward. The source code results generated by the design are previewed in real time. During the design process, errors in the design can be automatically checked and error tips will be given. For designs that contain errors, source code cannot be generated. There is a toolbox to manage data controls and layout controls to facilitate drag-and-drop design, and the hierarchy of layouts and controls can be displayed hierarchically.

2.2. Design model development
The design model includes a total of 8 design models, each for different design purposes, business model, data model, interaction model, service model, workflow model, and permission model. The interactive model will include a view model, a report model, and a dynamic report model. The business model is used to produce the data model and the interaction model, and the interaction model
is assembled. The data model is used to generate the specific database schema, and the service model will automatically generate the source code of the service interface. Workflow and authority are used to design the actual workflow and authority requirement description. All design models can be visually drag-and-drop designed, and each model has a corresponding XML language description, and the model can also be reverse-designed through the XML language itself.

2.3. Machine programming logic development
The essence of machine programming is that the computer knows how to parse the design model into the source code required for the program to run. This process needs to first analyze the matching relationship between the design model and the source code clearly, and express it through the T4 text engine. In this way, the machine knows how to write the source code from the design model, just as it knows how to program. Machine programming needs to understand the transformation relationship between all the design models and the source code, which is the core of machine programming.

2.4. Runtime framework development
The runtime framework is a basic function encapsulation as well as a basic function encapsulation. It is convenient for the source code of the IDE machine programming department to call basic functions, for example, the permission function set. The source code produced by the machine programming can call the corresponding API to complete the permission query. For example, the set of permissions functions, the source code produced by machine programming can call the corresponding API to complete the query of permissions, and also contains such functions as single sign-on function package, which can easily realize single sign-on of multiple systems; Skin peels frame, can realize a system appearance design easily; As well as multi-language package, easy implementation of multi-language versions, real-time runtime switching appearance and many other functions.

The specific experiment process is as follows:
(1) Take the student management system as an example, first establish a data model in the IDE as shown in Figure 1:

(2) Establish a business model based on the data model, as shown in Figure 2:
After the service model is established, select machine programming and wait for the system to generate code, as shown in Figure 3:

(4) After the production is over, the file browser window of the directory where the source code is located will automatically open. As shown in Figure 4:

3 Results
After the experiment is over, the test is carried out, and the machine can basically generate code. The final code is shown in the following figure:
4. Discussion
Compared with related systems, this system still needs to be improved. 1. In the machine programming link, the generated source code fails to realize the error correction function. Any development environment should have the error correction function, and the system still needs to be improved in the future. 2. The system can only generate code for all links. If it can generate part of the code according to user needs, the system has not considered it. The above two points need to be improved in the follow-up so that the platform can be applied.

5. Conclusions
This article applies the method of agile thinking to machine programming. With IDE core, the design, development, testing and other links are all completed under the influence and guidance of agile development. Comprehensive visual modeling features, easy to use, including business model, data model, interaction model are visual design modeling process. In the development process, machine programming technology is used to comprehensively analyze and complete the mapping relationship between the modeling model and the actual system source code. The programming is realized by the machine. Most of the programming work is completed by the machine, and only a small amount of code needs to be written manually. In addition, for all the generated data management modules, if the previous method is used to turn on or off the cloud feature of a software through the "cloud feature switch" in the modeling process, if this process is manually programmed, the complexity and difficulty will increase rapidly. While using machine programming, you only need to turn on the corresponding...
modeling switch to become a multi-user cloud system that can be published to the cloud. It is simple and easy to develop a cloud system, greatly shortening the development cycle of a cloud-based system. After testing, the machine can basically realize the code generation.

Acknowledgements
The work is supported by the special project of Shizuishan Science and Technology Development in Ningxia(2018-12).

References
[1] Huang, X.N., Yang, G., Yin, D., Liu, Y.W. (2019) Research on the agile iterative computer classroom teaching for the cultivation of College Students' innovative thinking ability. Software Guide (Educational Technology), 18:41-45.
[2] Yang, Y. (2018) Research on software curriculum design based on agile thinking. Electronic world, 22: 75-76.
[3] Wang, X. (2017) Project manager training based on agile project thinking. Chinese and foreign entrepreneurs, 19: 193.
[4] Li, W.W. (2016) An experimental study on measuring thinking agility and flexibility by CRT. Journal of Fuyang vocational and technical college, 27: 102-106.
[5] Wang, Q. (2017) Project manager training based on agile project thinking. Chinese and foreign entrepreneurs, 19: 193.
[6] Sun, Y.Y. (2009) Research on application technology of programmable control dosing manipulator. Chinese high tech enterprises, 16: 34-35.
[7] Mao, X.H. (2020) The introduction of machine translation and visualization technology in middle school programming class. Information technology and informatization, 03: 123-126.
[8] Srivastava, S., Vani, B., Sadistap, S. (2020) Machine-vision based handheld embedded system to extract quality parameters of citrus cultivars. Journal of Food Measurement and Characterization, 14: 2746-2759.
[9] Bianchi, M., Marzi, G., Guerini, M. (2020) Agile, Stage-Gate and their combination: Exploring how they relate to performance in software development. Journal of Business Research, 110: 538-553.
[10] Ren, Y.S. (2012) Research on the application of continuous integration in project component-based development. Shandong Normal University.
[11] Luo, D., Xu, W.G. (2019) A material programming method based on machine intelligence-Taking the application in 3D printing as an example. Architectural technology, 09: 15-19.