

Research on the problems and development of software quality in the new era

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Abstract: With the rapid development of information and intelligence, the number of software information projects continues to increase, people's dependence on information is getting higher and higher, the information system requirements are more and more rich, it is inevitable to the software quality requirements more stringent. For such as software defects, vulnerabilities, performance, security and so on. In view of these software quality problems, we conduct in-depth analysis and understanding of them, so as to improve the level of software quality and promote the high-quality development of software information. This paper first analyzes the deficiency of software quality under the background of the new era, and then discusses the future development direction in this field, in order to deepen the research on software quality.

Key words: software quality; New era; Software information problems; Cloud native; DevOps

Inteoduction

With the popularization and application of information technology, it has profoundly changed people's way of life and work, and people's dependence on information technology system is increasing day by day, which also puts forward higher expectations for software quality. Therefore, it is of great significance to effectively improve the level of software quality and the sustainable development of software service enterprises. On the basis of analyzing the problems related to software quality, this paper puts forward the methods to improve software quality, so as to continuously improve the quality of software information system, and finally achieve the purpose of improving the speed and stability of software delivery under the premise of ensuring software quality.

I. The existing problems of software quality in the new era

With the increasing dependence of people on information systems, higher requirements are put forward for software quality. This paper focuses on the user's point of view, the developer's point of view and the project management supervision point of view of software quality in the new era of outstanding problems.

1. User needs change frequently, increasing the uncertainty of the project

Demand change refers to correcting the requirements inconsistent with the initial plan in the process of software development or real-time, so as to better adapt to the existing business needs of customers. However, frequent demand change will seriously affect the software quality, such as the stability, reliability and consistency of products. First of all, the project team is too tired to cope with the demand changes, will ignore the stability and reliability of the software, reduce customer satisfaction, the team loses patience, difficult to deliver, forming a vicious circle. Secondly, the original plan is disrupted, the constraints and limitations of the original time period of the project are redefined, and the completion of the project task also brings great uncertainty. Thirdly, the cost is out of control. The change of demand will increase new workload, which may overturn the original design plan and double the cost, which is difficult for customers to accept. Finally, it affects the consistency of project deliverables. During the project construction process, many documents and code results will be produced, and frequent demand changes will cause inconsistency among deliverables due to the pressure of project schedule and cost, which will lay hidden dangers for later maintenance. Therefore, before software development, it is necessary for experienced demand analysts to do sufficient market research, not only to understand the real needs of customers, but also to have in-depth insight into the common needs of the industry, especially the vague or unfamiliar needs of customers, to play a guiding and decision-making role; For customer uncertainty needs, focus on the design of emergency plans; To determine the needs of customers, suggest industry standards, etc., in order to better cope with the future changes of customers.

2. Software development process is not standardized, increasing the difficulty of delivery

Software R & D process is the whole process of software from concept to final delivery. It needs relevant personnel with high professional level to accurately grasp the needs of customers in order to develop software that meets the value of customers. It includes requirements analysis, system design, coding, testing, acceptance, deployment, delivery and maintenance. The R & D process needs to have strict specifications. Deviant requirement analysis, wrong system design, defective code, lack of documentation and inefficient team cooperation will increase the complexity and uncertainty of the project, reduce the controllability and predictability of the project, and then increase the difficulty of delivery. Therefore, standardized research and development helps to improve the efficiency, quality and maintainability of the project, ensure that the project is delivered on time and in good quality, reduce the risk of project research and development, and improve customer satisfaction.

3. Software quality supervision mechanism is not perfect, which reduces customer satisfaction

Software quality management supervision mechanism is a system and method to ensure that the project reaches certain quality standards in the process of research and development. The main objective of the software quality management supervision mechanism is

to identify, prevent and correct the problems related to software quality, and ensure the delivery of the project on time and in quality and quantity. Usually, the software quality supervision mechanism will adopt software testing, quality assurance, code review, security audit, user feedback and other means to ensure that the software quality is effectively supervised and managed, improve the software quality, and earn customer satisfaction. The software quality supervision will formulate corresponding quality indicators according to the actual situation of the project to measure the software quality equivalent, such as defect rate, performance indicators, function coverage and so on.

II. The new era of software quality countermeasures

1. Formulate reasonable software quality management standards and supervision mechanisms

Software quality is a holistic concept, and the core is the attribute set of ability to meet explicit and implicit needs. Software quality management standards are a series of standards for quality management in the software industry, such as ISO9001, CMMI and ISO9120 quality model. Iso 9001 is a quality standard system for software development and maintenance. The core idea is “plan, execute, monitor and act” theory and method to ensure that customer needs are met. CMMI is the capability maturity model, which mainly evaluates the capability maturity of software, helps enterprises to diagnose the effectiveness of the process, formulate improvement strategies and implement improvements, improve the software life cycle time of software enterprises, increase productivity and measurable return on investment. ISO9120 is a software quality measurement model, the latest standard includes 8 features and 31 sub-features, 8 features including functional practicality, performance efficiency, compatibility, availability, reliability, security, maintainability and portability, covering all activities of the software life cycle. Software enterprises can choose the appropriate standard system according to the actual business situation of the enterprise, diagnose the problems existing in the enterprise, optimize the standard process of the enterprise, establish the corresponding quality management system, supervise the research and development process of the project in strict accordance with the quality management system, constantly optimize the iteration, improve the enterprise project delivery ability and customer satisfaction, and then enhance the competitiveness of the enterprise in the market.

2. Introduce DevOps method to implement the software engineering management of the whole life cycle

DevOps (Development and Operations, software development and Operations) is an approach that combines development and operations to improve the deliverability and quality of software through automation, collaboration, and continuous improvement. Because this method is popular, mature and effective, the author’s practice has proved that it can be introduced into the project development process. The advantages of this method are as follows: First, through CI (Continuous integration) and automatic tool set, continuous integration can be realized, which can automatically run the construction and test operation, quickly iterate the function of the project, timely discover and solve the error, shorten the verification and release of the new version of the project, and greatly improve the delivery ability; Second, through CD (continuous delivery) and automation tool set, continuous delivery can be achieved to support the horizontal expansion and automatic deployment of project applications, effectively utilize hardware and software resources, timely release the latest version of the project to the test environment or production environment, reduce the tedious and repetitive manual intervention work of developers, avoid the impact of human errors, and shorten the delivery time. Improve the delivery quality; Third, DevOps advocates the standardization of software development process, strengthens the close cooperation and communication between development and operation and maintenance teams, and blurs the boundaries of development and operation and maintenance work responsibilities, that is to say, development and operation and maintenance teams can be combined into one, greatly reducing R&D costs and improving R&D efficiency. Overall, this method speeds up the business response speed, code quality and security, and can significantly reduce the probability of error.

III. The development trend of software quality in the new era

1. Development trend of standardization

Software standardization is a complex process of continuous evolution, which is influenced by many factors such as team, market, technology, regulations and corporate strategy. Standardization implementation is an important foundation for strengthening standardization and improving reusability. The development of software standardization is closely related to emerging technologies, security, compliance and market demand, ensuring that the standardization process is more in line with the development of enterprises and applicable to the development trend of the new era. First of all, based on the software company’s strategic goals into specific executable plans, optimize the enterprise operation mode through standardized design, structure the company’s organizational structure, clarify the responsibilities and objectives of the organization members, and form a standardized management system of the enterprise. Secondly, using emerging technologies to further optimize the standardization system of the enterprise, reduce manual intervention and maximize the use of automation system. For example, the development of cloud computing and containerization standards to reduce operation and maintenance costs; Designating open source standards to promote the development of the industry. Finally, establish a standardized enterprise ecology, establish industry standards, strong constraints on the upstream and downstream development results, and constantly improve the upstream and downstream ecology of the industry, to ensure that enterprises maintain flexibility and practicality in the changing market, and improve the competitiveness of the industry.

2. Segmented management trend

Segmented management is based on the needs of customers to effectively define the project into a number of stages, each stage according to the corresponding quality requirements respectively management and control, segmented management for complex and cumbersome software development process management is an ideal choice. First of all, the software development process is composed

of multiple stages including demand analysis, system design, coding, testing, acceptance, deployment, delivery and maintenance. The definition between the stages is clear, and the objectives, quality management system and deliverables of each stage are clear, which makes phased management possible. Secondly, the team division of labor at each stage is clear, the deliverables and evaluation are clear, and the regular report and evaluation make it easier to understand the status of the project, control and supervision, and identify potential risks and problems. Finally, different stages can be optimized and adjusted according to the changing needs and the actual situation of customers, so as to enhance the flexibility of the process and better adapt to the ever-changing customer needs.

3.DevOps approach to managing trends

The core idea of DevOps is to unify development and operations -- “he who writes the code, he who maintains it.” Traditional DevOps believes that developers bear the code work at the same time, also bear the operation and maintenance work, whether it is the application layer, or the underlying infrastructure layer related technologies need to be proficient, it is a huge challenge for developers, for enterprises, the instability of developers may cause the failure of the project. With the continuous improvement and development of cloud computing technology, the design and development of cloud-native applications are becoming more and more mature. With the advantages of cloud computing, a set of standard system for design and construction of tool chain is formed to provide self-service for developers and realize the end-to-end process of application (including design, development, testing and operation and maintenance, etc.). Developers only need to knock out good code. One-click completion of testing, operation and maintenance work, do not need to become a technical expert in the whole field, and truly realize the unity of development and operation and maintenance.

Concluding Remarks

In the new era, as the function of software becomes more and more complex, the scale of software is getting larger and larger, and the requirements of software quality are getting higher and higher. Software quality is directly related to the survival of the company, and strengthening software quality has become an important strategy for the development of software companies. Many factors that constitute software quality are not independent, but interrelated, some have positive correlation and some have negative correlation. Software companies weigh them according to the actual situation of the enterprise, build a standardized quality management system, adopt phased management and management means of emerging technologies, and effectively solve the problems of frequent changes in demand, poor delivery ability and low customer satisfaction. To ensure the quality control and improvement of the project process, improve the stability and reliability of the software, enhance the user experience, and enhance the sustainability and competitiveness of the enterprise.

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