3rdclass

Software Engineering

هندسة البرمجيات

اساتذة المادة: م.ازل منشد , م.م زينب خيون

University of mustansiriyah/College of Education

Computer Science Department

Software Engineering 3rd Class

Lecturer Azal monshad & zainab khyioon

Chapter 1: An Introduction to Software Engineering

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1.1 The Computer Software :

It is the product that software engineers design and build. It encompasses programs that execute within a computer of any size and architecture, documents that encompass hard-copy and virtual forms, and data that combine numbers and text but also includes representations of pictorial, video, and audio information .

Software engineers built it, and virtually everyone in the industrialized world uses it either directly or indirectly .

When you built computer software like you built any successful product, by applying a process that leads to a high-quality result that meets the needs of the people who will use the product. You apply a software engineering approach .

The software might take the following forms :

1.Instructions: Computer programs, that when executed provide desired function and performance .

2. Data structured: That enable the programs to adequately manipulate information .

3. Documents: That describes the operation and use of programs.

يستخدم مصطلح برمجيات (software) عادة للاشاره الب برامج الحاسوب (computer programs)وفي الحقيقة ليس هذا الا جزءا من التعريف حيث تتكون البرمجيات عامة من :_

- برامج (Programs/ Instructions) : تعليمات للحاسوب لتنفيذ عمل محدد.
- التوثيق (Documentation / Documents) : وثائق تصف طريقة اعداد البرنامج واستخدامه ومن امثلتها كتيب التشغيل (User Manual)
- البيانات (Data) : وتكون اما على صوره | نص او صوره ثابته او متحركة (فيديو)
- Data Structured: وهي التي تمكن البرامج من معالجة المعلومات .

في البداية كانت كلمة برنامج هي المستخدمة فيما يعرف اليوم بالبرمجيات Software (المنظومات) بعد اضافة التوثيق . ولا شك ان نقص التوثيق او عدم وجوده يؤدي الى الارتباك في متابعة المنظومة وتشغيلها من قبل المستخدم بصوره مثلى . لذلك بدا الاهتمام بالتوثيق ولكن لم يخل الامر من بعض المشاكل حتى بعد اضافة التوثيق فظهرت مشاكل متعددة بسبب تنوع وتعقد المنظومات المراد اعدادها .

هذه المشاكل عرفت باسم ازمة البرمجيات وهي تعني المشاكل التي تمت مواجهتها اثناء اعداد المنظومات البرمجية نظرا لزيادة احتياجات ومتطلبات الزبون وازدياد حجم البرمجيات . لذلك المختصون للبحث عن حل لهذه الازمة وكان الحل هو اتباع الاسلوب الهندسي في اعداد المنتوج على شكل مشروع مما يستوجب تعيين مدير مشروع وفريق عمل . والنقطة الاخرى في الاسلوب الهندسي هي ان المنتوج يمر عبر مراحل هي التحليل , والتصميم , والتنفيذ , والاختبار , والصيانة . والنقطة الثالثة التي استدعت اللجوء الى الاسلوب الهندسي هي الاهتمام بجودة المنتوج ولا شك ان موضوع الجودة يعتبر من اولويات الاهتمامات .

1.2 Software Engineering:

Software engineering is an engineering discipline that is concerned with all aspects of software production from the early stages of system specification through to maintaining the system after it has gone into use

In this definition, there are two key phrases:

1- Engineering discipline: Engineers make things work. They apply theories, methods and tools where these are appropriate, but they use them selectively and always try to discover solutions to problems even when there are no applicable theories and methods.

2- All aspects of software production : software engineering is not just concerned with the technical processes of software development but also with activities such as software project management and with the development of tools, methods and theories to support software production.

تعريف هندسة البرمجيات (Software Engineering)

هندسة البرمجيات : هو وصف هندسي التي هي تصف كل جوانب انتاج البرمجيات من المراحل المبكرة للمواصفات نظام للغاية الوصول للمرحلة استخدامه .

1.3 Software Characteristics

1. Software is developed or engineered.
2. Most of software is custom build rather than assemble from existing component.
3. Computer program and associated documentation.
4. Easy to modified.
5. Easy to reproduce.
6. Software product may be developed for a particular customer or for the general market.

1.4 Programmer & Software Engineer

Software is not just the programs but also all associated documentation and configuration data which is needed to make these programs operate correctly. **A software system consists of:**

-separate programs

-configuration files to setup programs

-system documentation to describe the structure of the system.

-User documentation to explain how to use the system .

- Web sites to down load recent product information.

.15 The characteristic of software engineer

1. Good programmer and fluent in one or more programming language .

2.Well versed data structure and approaches .

3.Familiar with several designs approaches .

4.Be able to translate vague (not clear) requirements and desires into precise specification .

5.Be able to converse with the user of the system in terms of application not in "computer ."

6.Able to a build a model. The model is used to answer questions about the system behavior and its performance .

7. Communication skills and interpersonal skills.

خصائص مهندس البرمجيات (characteristic of software engineer):

1. مبرمج جيد ويجيد واحدة او اكثر من اللغات البرمجية
2. يمتلك دراية جيدة في هياكل البيانات ومناهجها
3. لديه دراية بطرق التصاميم المتعددة
4. ان يكون قادرا على ترجمة المتطلبات الغامضة (الغير واضحة) والرغبات الى مواصفات دقيقة .
5. قادرة على بناء النموذج . يتم استخدام النموذج للاجابة على الاسئلة حول سلوك النظام وادانه.
6. يمتلك مهارات الاتصال ومهارات التعامل مع الاخرين .

1.6 Software Applications

The following software areas indicate the breadth of potential applications :

1.System software: It is a collection of programs written to service other programs .Some system software (e.g., compilers, editors, and file management utilities) process complex, but determinate, information structures. Other systems applications (e.g ,.operating system components, drivers, telecommunications processors) process largely indeterminate data .

2.Real-time software: Software that monitors/analyzes/controls real world events as they occur is called real time. Real-time differs from "interactive" or "time sharing". A real-time system must respond within strict time constraints.

The response time of an interactive (or time sharing) system can normally be exceeded without results.

3.Business software: Business information processing is the largest single software application area. Discrete "systems" (e.g., payroll, accounts receivable/payable, inventory).

4.Engineering and scientific software: modern applications within the engineering/scientific area are moving away from conventional numerical algorithms. Computer-aided design, system simulation, and other interactive applications have begun to take on real-time and even system software characteristics.

5. Embedded software: Intelligent products have become commonplace in nearly every consumer and industrial market (e.g., keypad control for a microwave oven or digital functions in an automobile such as fuel control, and braking systems.(

6. Personal computer software: Such as(Word processing, spreadsheets, computer graphics, multimedia, entertainment, database management.(

7. Web-based software: The Web pages retrieved by a browser are software that incorporates executable instructions (e.g., HTML, Perl, or Java), and data (e.g,. hypertext and a variety of visual and audio formats.(

8. Artificial intelligence software: It makes use of no numerical algorithms to solve complex problems that are not amenable to computation or straightforward analysis. Expert systems, also called knowledge-based systems, pattern recognition (image and voice), artificial neural networks, theorem proving, and game playing are representative of applications within this category.

1.7 The Evolving Role of Software:

Today, software takes on a dual role. It is a product and, at the same time, the vehicle for delivering a product.
1. As a product: it delivers the computing potential embodied by computer hardware or, more broadly, a network of computers that are accessible by local hardware. Whether it resides within a cellular phone or operates inside a

mainframe computer, software is information transformer (producing, managing, acquiring, modifying, displaying, or transmitting) information that can be as simple as a single bit or as complex as a multimedia presentation.
2. As the vehicle used to deliver the product: software acts as the basis for the:
a. control of the computer (operating systems.(
b. The communication of information (networks).
c. The creation and control of other programs (software tools and environments .(The role of computer software has undergone significant change over a time span of little more than 50 years. Dramatic improvements in hardware performance ,profound changes in computing architectures, vast increases in memory and storage capacity, and a wide variety of exotic input and output options have all precipitated more sophisticated and complex computer-based systems. Sophistication and
Complexity can produce dazzling results when a system succeeds, but they can also pose huge problems for those who must build complex systems .
The lone programmer of an earlier era has been replaced by a team of software specialists, each focusing on one part of the technology required to deliver a complex application.

1.8 Software: A crisis on the horizon

Whether we call it a software crisis or affliction, the term alludes to a set of problems that are encountered in the development of computer software. The problems are not limited to software that “doesn’t function properly”. Rather, the affliction encompasses problems associated with how we develop software, how we support a growing volume of existing software, and how we can expect to keep pace with a growing demand for more software.

1.9 The Attributes of Good Software

As well as the service which they provide software products have a number of other associated attributes which reflect the quality of that software.

These attributes are not directly concerned with what the software dose, rather they reflect its behavior which it is executing and the structure and organization of the source program and associated documentation. Examples of these attributes (some time called non-functional attributes) are the software's response time to use query and the understandability of the program code. The specific set of attributes which you might expect from a software system obviously depends on its application. Therefore a banking system must be secure, on interactive game must be responsive, a telephone switching system must be reliable, etc. these can be generated in the following attributes:

1- **Maintainability**: software should be written in such a way that it may evolve to meet the changing needs of customer. This is critical attribute because software change is an inevitable

2- **Dependability**: software dependability has a range of characteristics, including reliability, security and safety. Dependable software should not cause physical or economic damage in the event of system failure.

3- **efficiency**: software should not make wasteful use of system resources, such as memory and processor cycles. Therefore efficiency includes responsiveness, processing time, memory utilization etc…

4. **Usability**: software must be usable, without under effort by the type of user for whom it is designed. This means that it should have an appropriate user interface and adequate documentation.

1.10 The Goals of Software Engineering

- Readability
- Correctness
- Reliability
- Reusability
- Extensibility
- Flexibility
- Efficiency