Chapter 7: Software Maintenance

Topics

7.1) Different types of maintenance

7.2) Configuration management

7.1 Different types of maintenance

Software Maintenance

Process of changing system after it is delivered

Software Maintenance

- ✔Software errors
- ✔Installation of new hardware
- ✔Customer needs

Reasons for changes

Types of Software Maintenance

Corrective Maintenance

- ✔To locate and fix errors
- ✔E.g. Fixing banking application so that it posts deposits to correct amount

Types of Software Maintenance

Adaptive Maintenance

- ✔To compile software with new environment/ changes in its external environment.
- ✔ E.g. Modifying code so that software will run on new hardware platform or operating system.

Types of Software Maintenance

Perfective Maintenance

- ✔ To improve software system's usefulness.
- ✔New functional/non-functional requirements.
- ✔ E.g. Adding a search feature, making report more readable

Factors that Affecting Maintenance Cost

Module independence

- ✔ High independency among modules, low maintenance cost.

Factors that Affecting Maintenance Cost

Programming Language

- ✔ High level programming language, low maintenance cost.

Factors that Affecting Maintenance Cost

Programming Style

- ✔ Good programming structure, low maintenance cost.

Factors that Affecting Maintenance Cost

Program Validation & Testing

- ✔ More time spent in program validation and testing, more error found and fixed during the testing phase, thus low maintenance cost because the system has less error.

Factors that Affecting Maintenance Cost

Documentation Quality

- ✔ Good quality and good understanding of documentation, low maintenance cost.

Factors that Affecting Maintenance Cost

Configuration Management Techniques

- ✔ Configuration management technique makes it is easy to keep track all versions, low maintenance cost.

Factors that Affecting Maintenance Cost

Application Domain

- ✔ New application domain, less understanding of the application domain, high maintenance cost.

Factors that Affecting Maintenance Cost

Staff Stability

- ✔ New project reassignment to staff, high maintenance cost.
- ✔ If same staff maintain for the project, low maintenance cost.

Factors that Affecting Maintenance Cost

Age of the program

- The older the program, the greater the maintenance it receives, high maintenance cost.

Factors that Affecting Maintenance Cost

The dependence of the program on its external environment

- ✔ Highly dependence of the program on environment changes, high maintenance cost.

Factors that Affecting Maintenance Cost

Hardware stability

- ✔ If hardware no need to change, low maintenance cost.

Maintenance Cost

The costs of adding functionality to a system after it has been put into operation are usually much greater than providing similar functionality when software is originally developed.

WHY?

Maintenance Cost

- Maintenance staff are often relatively inexperienced and unfamiliar with the application domain
- The programs being maintained may have been developed many years ago without modern software engineering techniques. Therefore they may be unstructured and difficult to understand.
- Changes made to a program may introduce new faults, which trigger further change requests.

Maintenance Cost

- As a system is changed, its structure tends to degrade. This makes the system harder to understand & the program becomes less cohesive.

- The links between a program and its associated documentation are sometimes lost during the maintenance process. The documentation may therefore be an unreliable aid to program understanding.

7.2 Configuration Management (CM)

What is Configuration Management (CM)?

– CM is the process of identifying a software system's configuration and controlling the changes to it.

Configuration is the set of :

✔functional components (i.e. system features) and

✔physical components (e.g. requirements specification, end user's manual)

What is Configuration Management (CM)?

– A well conceived CM process ensures multiple configurations (i.e. versions) of a software system can be maintained and reconstructed when required.

Software Configuration Items

- Represents parts/pieces produced during software development.
- Integral part of software system's configurations.
- Represent software artifact e.g. design document, single software component, test plan.
- Or represent collection of software artifacts e.g. edit/add/modify/delete program, software components and its program specification.

Software Configuration Baselines (SCB)

- SCB is the formally and fully approved set of software configuration items baseline (SCIB).
- SCIB is the configuration items has passed unit, integration, system, and acceptance testing and has been deemed ready for release.

Software Configuration Baselines (SCB)

- Once existing baseline has been modified, tested, and approved, it becomes new baseline.
- Establishing and maintaining baselines allows to control the modification, testing, and approval of organization's configuration items and software configuration includes them.
- Maintaining multiple baselines of same items allows to preserve original version of SCIB so that can maintain and reconstruct various versions of system.

Software Change Control

- SCB can only be modified through formal software change control.
- Software change control is a process of managing changes to software system's SCIs.
- Manage the flow of activities:
  1. Origination of change request
  2. Approval of change request
  3. Acting on change request
  4. Tracking and closing change request

Software Configuration Management Personnel

Two key personnel:

1. **Software configuration manager**

   - Leading and managing CM processes.

2. **Software change control board**

   - Evaluating the proposed changes to software configuration items and making decisions with regard to those changes.

The End