Lecture No - 40

UNIT - 5

Software Maintenance & Software Project Management.

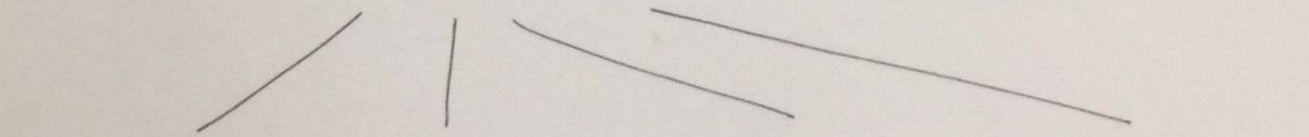
Contents :- S/w Maintenance, Types of S/w Maintenance

→ According to IEEE S/w maintenance is a modification of a S/w product after delivery to correct faults, to improve performance or other attributes or to adapt the product to a modified environment

→ Maintenance consume about 40-70% of the cost of entire life cycle.

→ It includes error correction, enhancement of capability, deletion of absolute capabilities and optimization.

Types of S/w Maintenance



Corrective Maintenance -

This includes modifications and updations done in order to correct or fix problems, which are either discovered by user or conducted by user error reports.

Adaptive Maintenance -

This includes modifications and updations

applied to keep the software usable for long periods of ~~time~~ product up-to date and turned to ever changing world of technology and business environment.

Perfective Maintenance -

This includes modifications and updates done in order to keep the software usable over long period of time. It includes new features, new user requirements for refining the s/w and improve its reliability & performance.

Preventive Maintenance -

This includes modifications and updations to prevent future problems ~~of~~ the s/w. It aims to attend problems, which are not significant at this moment but may cause serious issues in future.

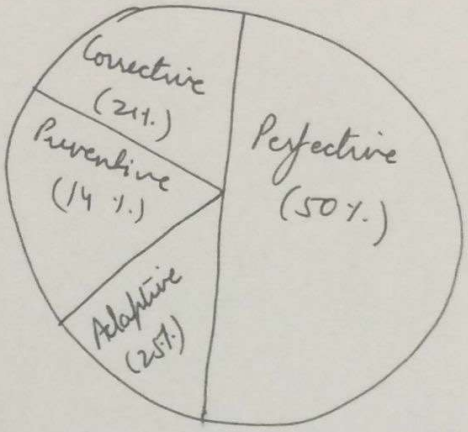
Problem during maintenance -

- → Unstructured code
- → Maintenance programmers ~~using~~ having inefficient knowledge of the system.
- → Documentation being absent and information gap.
- → Out of data or insufficient designing of the system so that the system are not designed for the change.

Potential solution to Maintenance Problems -

→ Budget and effort reallocation.
→ Complete Replacement of the system.
→ Maintenance of existing system.

Categories of S/w Maintenance -



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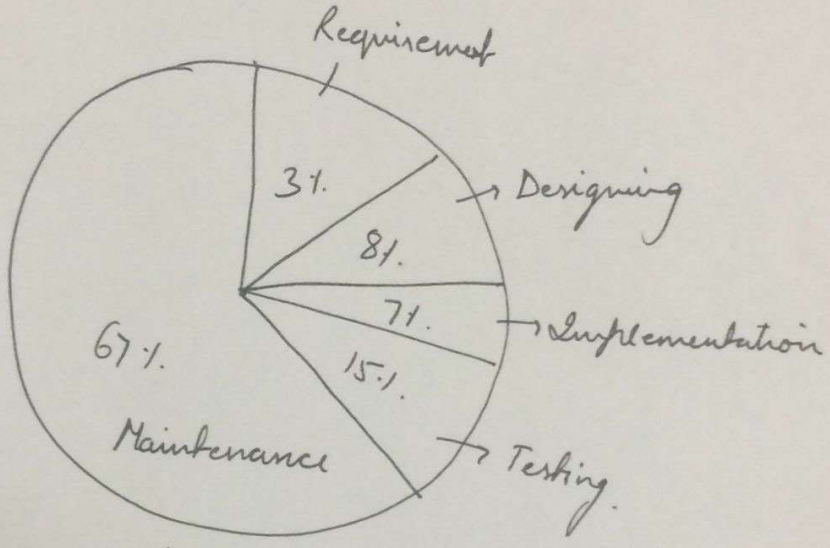
Contents :- Cost of Maintenance, Various Cost maintenance factors

Cost of Maintenance Cost.

→ Cost of Maintenance is high. The cost of maintenance is as high as 67% of the cost of entire s/w process cycle.



Cost of Maintenance is more than 50% of all SDLC phases.

Various factors that trigger Maintenance Cost -

Real-World Factors -

→ Standard age of any s/w is considered upto 10-15 yrs.

→ Old s/w cannot challenge against newly coming enhanced s/w on modern Hw.

→ As technology advances, it becomes costly to maintain old s/w.

→ Most maintenance engineers are newbie and use trial and error method to rectify problem.

→ Often, changes made can easily hurt the original structure of the s/w making it hard for any

subsequent changes.

→ Changes are often left undocumented which may cause more conflicts in future.

Software-end factors -

→ Structure of S/W Program.
→ Programming languages.
→ Dependence on external environment.
→ Staff reliability and availability.

Cost of Maintenance -

→ Belady & Lehman Model.

$$M = P + K^{c-d}$$

where :

M = total effort expended.
P = Productive effort that involves analysis, design, coding, testing & evaluation.
K = an empirical determined constant.
C = Complexity measures due to lack of good design & documentation.
d = degree to which maintenance team is familiar with the S/W.

Bohem Model -

Bohem Bohem used a quantity called annual change traffic. (ACT)

$$ACT = \frac{KLoc\ added + KLoc\ deleted}{KLoc_{total}}$$

$$AME = ACT \times SDE$$

Where

AME = Annual Maintenance effort.

SDE = S/w Development effort in person months.

$$AME = ACT * SDE * EAF$$

EAF = estimation adjustment factor.

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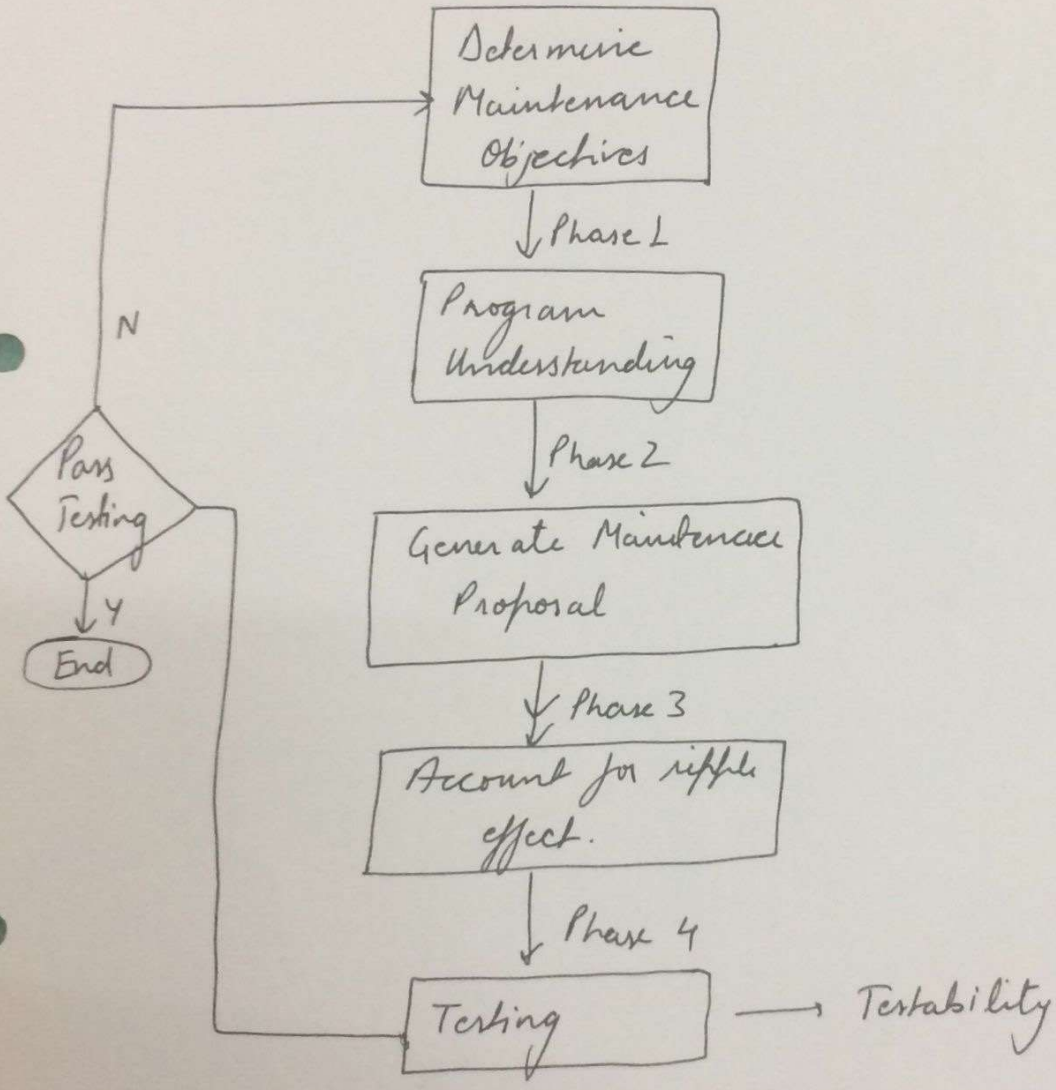
Contents:- Maintenance Process

Maintenance Process -



Phase 1 -

- → Correct Program errors.
- → Add new capabilities
- → Delete Obsolete features
- → Optimization.

Phase 2 -

→ Complexity
→ Documentation
→ Self Descriptiveness.

Phase 3 -

→ Extensibility

Phase 4 -

→ Stability

Phase 5 →

→ Testability.

Need for Maintenance -

→ S/w Maintenance is needed for rescoping and engineering of existing application system.
→ To Trouble shooting and upgrades of existing system.
→ System & Integration analysis.
→ Data Mapping of ~~exting~~ existing system.
→ Programming on the newer technologies.
→ Web application Maintenance for internal business use, e-commerce etc.