

# 10. Software Maintenance and Maintenance Process Model

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# Discussion Topics

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- Software Maintenance
- Software Maintenance Process Models
- Software Reengineering
- Maintenance cost estimation

# Software Maintenance

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- Software Maintenance is the process of modifying a software product after it has been delivered to the customer.
- The main purpose of software maintenance is to modify and update software application after delivery to correct faults and to improve performance.
- There are basically three types of software maintenance. These are
  - **Corrective**
  - **Adaptive**
  - **Perfective**

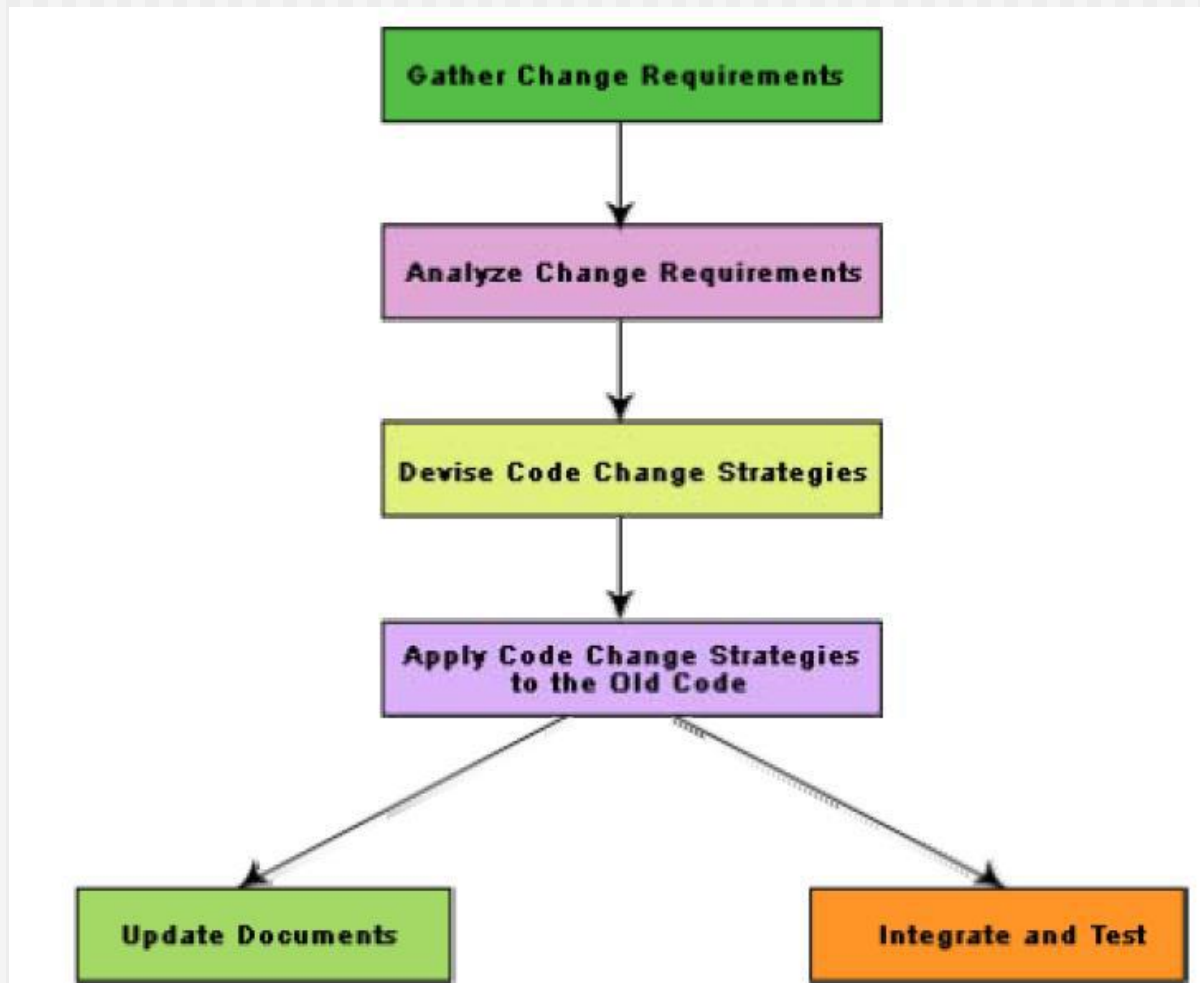
# Maintenance Process Models

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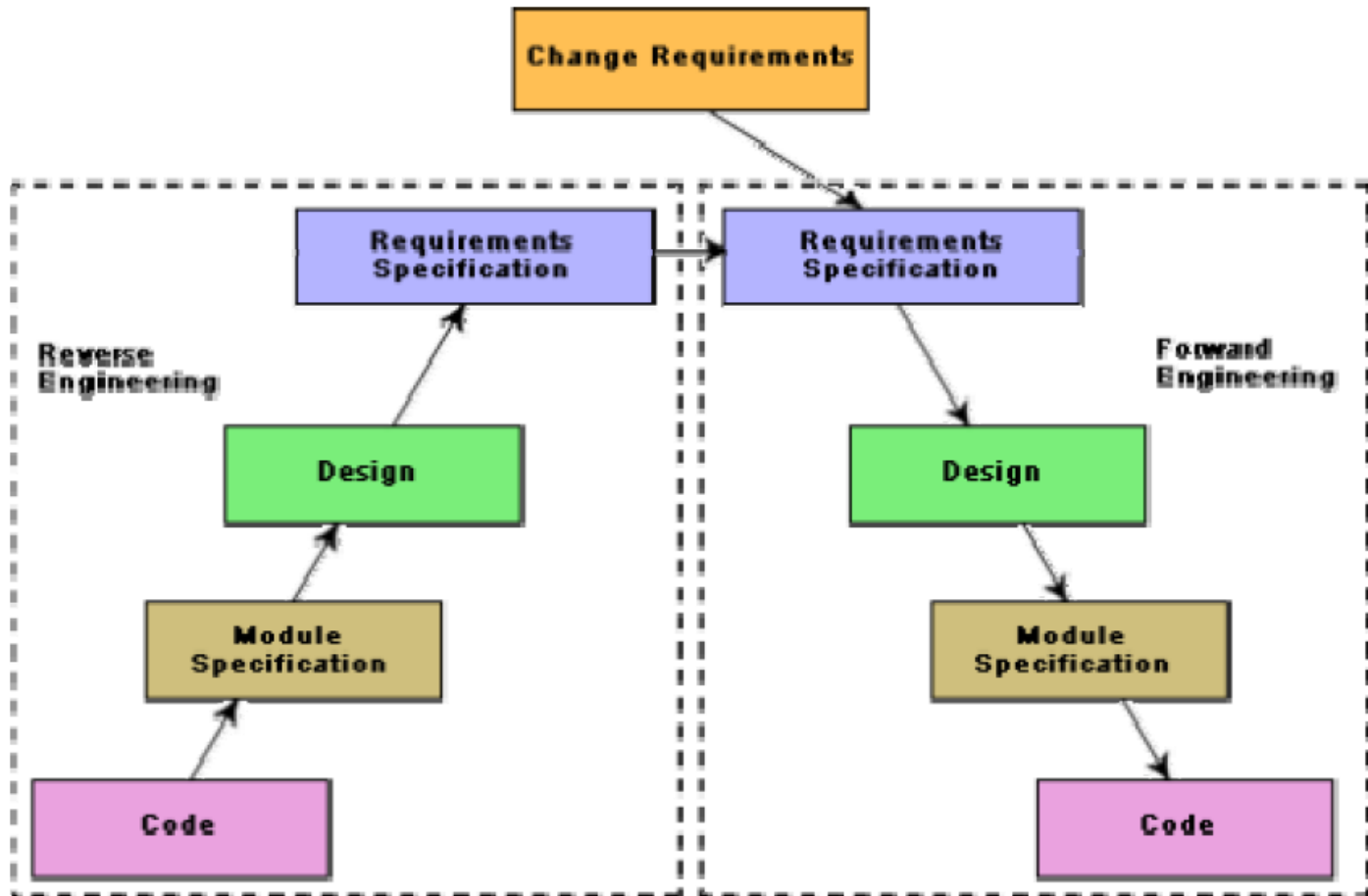
- Two broad categories of process models for software maintenance can be proposed.
- The first model is preferred for projects involving small reworks where the code is changed directly and the changes are reflected in the relevant documents later. This maintenance process is graphically presented in [fig.1](#).
- The second process model for software maintenance is preferred for projects where the amount of rework required is significant. This maintenance process is graphically presented in [fig.2](#).

# Figure 1

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# Figure 2



# Software Reengineering

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- Software reengineering is a combination of two consecutive processes i.e. software reverse engineering and software forward engineering as shown in the fig 2.

# Estimation of approximate maintenance cost

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- It is well known that maintenance efforts require about 60% of the total life cycle cost for a typical software product.
- However, maintenance costs vary widely from one application domain to another.
- Boehm [1981] proposed a formula for estimating maintenance costs as part of his COCOMO cost estimation model. Boehm's maintenance cost estimation is made in terms of a quantity called the Annual Change Traffic (ACT). Boehm defined ACT as the fraction of a software product's source instructions which undergo change during a typical year either through addition or deletion.



# Estimation of approximate maintenance cost

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- $ACT = \frac{KLOC\ added + KLOC\ deleted}{KLOC\ total}$
- Here,
  - *KLOCadded* is the total kilo lines of source code added during maintenance.
  - *KLOCdeleted* is the total kilo lines of source code deleted during maintenance.
- maintenance cost =  $ACT \times$  development cost.

# Exercise

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Find the maintenance cost of a software product where there are a total of 55000 lines of coding. During maintenance 80000 lines of coding was added and 3500 lines of coding was deleted. Development cost of the project was 5 lacs BDT.