Software Re-engineering and Reverse Engineering

Re-engineering

Software Re-engineering is a process of software development which is done to improve the maintainability of a software system. Re-engineering is the examination and alteration of a system to reconstitute it in a new form. This process encompasses a combination of sub-processes like reverse engineering, forward engineering, reconstructing etc.

Re-engineering is the reorganizing and modifying existing software systems to make them more maintainable.

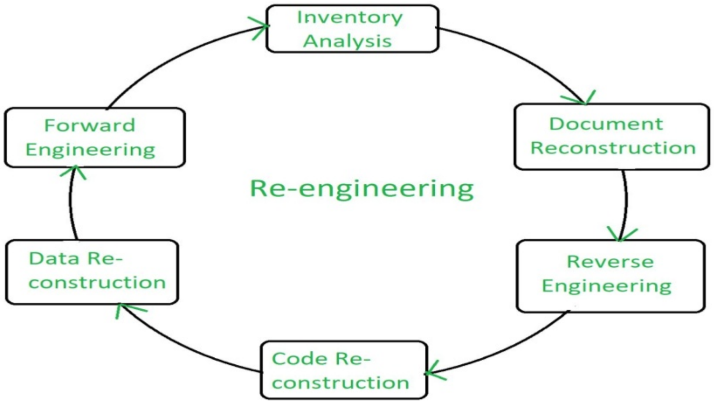
Objectives of Re-engineering:

- To describe a cost-effective option for system evolution.
- To describe the activities involved in the software maintenance process.
- To distinguish between software and data re-engineering and to explain the problems of data re-engineering.

Steps involved in Re-engineering:

1. Inventory Analysis
2. Document Reconstruction
3. Reverse Engineering
4. Code Reconstruction
5. Data Reconstruction
6. Forward Engineering

Diagrammatic Representation:



Re-engineering Cost Factors:

- The quality of the software to be re-engineered
- The tool support available for re-engineering
- The extent of the required data conversion
- The availability of expert staff for re-engineering

Advantages of Re-engineering:

- **Reduced Risk:**
  As the software is already existing, the risk is less as compared to new software development. Development problems, staffing problems and specification problems are the lots of problems which may arise in new software development.
- **Reduced Cost:**
  The cost of re-engineering is less than the costs of developing new software.

Reverse Engineering

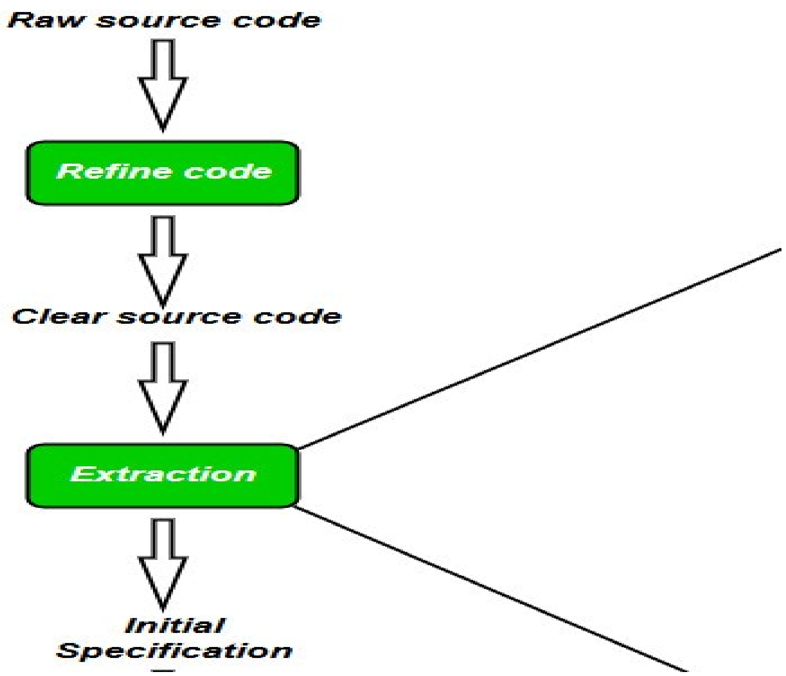
Software Reverse Engineering is a process of recovering the design, requirement specifications and functions of a product from an analysis of its code. It builds a program database and generates information from this.

The purpose of reverse engineering is to facilitate the maintenance work by improving the understandability of a system and to produce the necessary documents for a legacy system.

Reverse Engineering Goals:

- Cope with Complexity.
- Recover lost information.

- Detect side effects.
- Synthesise higher abstraction.
- Facilitate Reuse.



Steps of Software Reverse Engineering:

1. **Collection Information:**
   This step focuses on collecting all possible information (i.e., source design documents etc.) about the software.

2. **Examining the information:**
   The information collected in step-1 as studied so as to get familiar with the system.

3. **Extracting the structure:**
   This step concerns with identification of program structure in the form of structure chart where each node corresponds to some routine.

4. **Recording the functionality:**
   During this step processing details of each module of the structure, charts are recorded using structured language like decision table, etc.

5. **Recording data flow:**
   From the information extracted in step-3 and step-4, set of data flow diagrams are derived to show the flow of data among the processes.

6. **Recording control flow:**
   High level control structure of the software is recorded.

7. **Review extracted design:**
   Design document extracted is reviewed several times to ensure consistency and correctness. It also ensures that the design represents the program.

8. **Generate documentation:**
   Finally, in this step, the complete documentation including SRS, design document, history, overview, etc. are recorded for future use.