Introduction to Software Engineering

# Program vs. Software

## Meaning of Program & Software

- A program is a set of instructions written in a programming language used to execute a specific task or particular function.
- Software is a collection of several programs and other procedures and documentation

# Program vs. Software

- A program consists of a set of instructions that are coded in a programming language like c, C++, PHP, Java etc.
- Software consists of bundles of programs and data files. Programs in specific software use these data files to perform dedicated types of tasks.

# Program vs. Software

- Program has limited functionality and fewer features.
- Software has lots of functionality and features such as GUI, input/output data, process etc.
- A program may not be software.
- Software can be a program.

# Program vs. Software

- A program takes less time to construct.
- Software takes relatively more time to build/make when compared to a program.
- Program development approach may be un-procedural, unorganized and unplanned.
- Software development approach is systematic, organized and very well planned.

# Program vs. Software

- The size of a program may range from kilobytes (KB) to megabytes (MB).
- The size of software may range from megabytes (MB) to Gigabytes (GB).
- Program may have patchy documentation mostly technical
- Software has Comprehensive documentation including user manuals

# ISO 9126 Software Quality Model

## Functionality

- The ability to perform a task or a function which any product or service is designed. For example, a light bulb should be able to provide light based on the specified parameters.
- In the case of software, functionality refers to the suitability, accuracy, interoperability, compliance, security features of the software to its intended purpose.

# Reliability

- The capability of the system to maintain its service provision under defined conditions for defined periods.
- For example, it could mean the failure rate of the software is once per million hours of operation.

# Usability and Efficiency

**Usability**

- Ease of operation and the amount of effort or time required to learn how to use the software.

**Efficiency**

- Ability to use the resources of the system most effectively and efficiently. Example system storage, memory, and network resources and execute a command as per required timing.

# Maintainability and Portability

**Maintainability**

- Ease of modifications to extend or enhance its functionality, improve its performance, or resolve bugs.

**Portability**

- Adapt to changes in its environment. Ease with which developers can re-launch software from one platform to another, without (or with a minimum) changes.

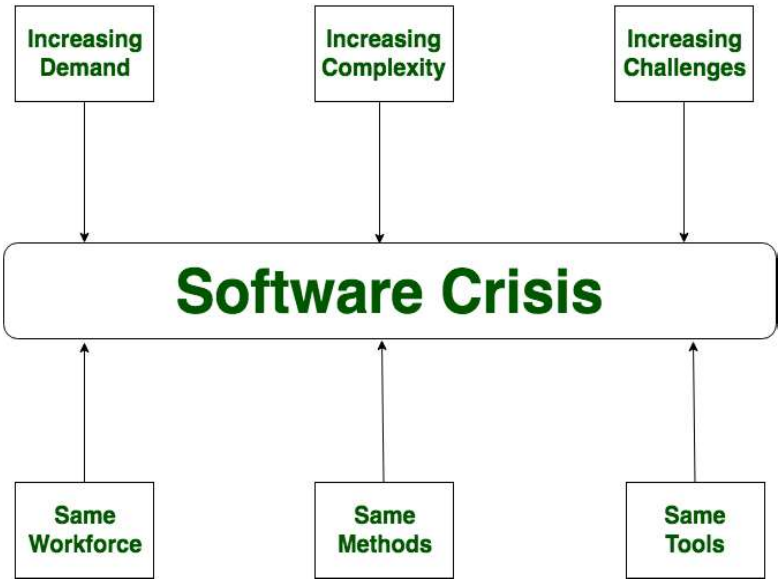


## Software Crisis - Final Thoughts

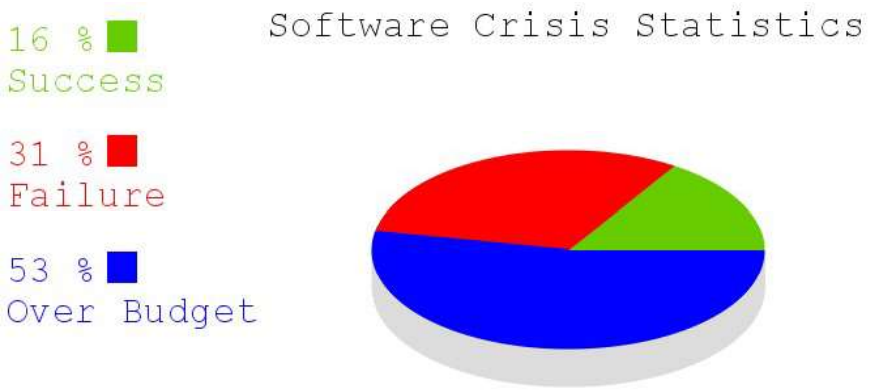
# Software Crisis

- Software crisis can be traced to unplanned, poorly written, hard to read, error-prone software that often lacks good documentation.

# Gist of the Reasons…



# Software Crisis in terms of statistics




# Problems due to the Software crisis

- Projects running over-budget
- Projects running over-time
- Software very inefficient
- Projects were unmanageable and code difficult to maintain
- Software of low quality
- The software often did not meet requirements

# Factors contributing to the software crisis [1/2]

- Large and complex problems,
- Lack of inadequate training in software engineering,
- Increasing skill shortage,
- Low productivity improvements,
- Requirement changes being inevitable,

# Factors contributing to the software crisis [2/2]

- Requirements not getting frozen,
- Customer is not clear with their requirements,
- Market demand/conditions change
- Manpower turnover,
- Technology/Process change

# Illustration of a famous Software Crisis Y2K Problem

- In 19th-century date format used was ddmmyy (say 1st Jan 1999 was written as 010199 and it year is assumed to be 1999 by default).
- When the 20th century came, (say 1st Jan 2000 was written as 010100 and according to old format the year was assumed to be 1900).
- Software that used two digits to represent years produced incorrect results or failed.