

# Software Engineering and Automation

Sumit Kalra

Phd\* Indian Institute of Technology(IIT) ,Kanpur U.P India

sumit.k.iitk@gmail.com

## Abstract

This paper is about Software Engineering, Software Engineering, is the application of a systematic, disciplined, quantifiable approach to the design, development, operation, and maintenance of software, and the study of these approaches; that is, the application of engineering to software. The initial impact of outsourcing, and the relatively lower cost of international human resources in developing third world countries led to a massive migration of software development activities from corporations in North America and Europe to India and later: China, Russia, and other developing countries. This approach had some flaws, mainly the distance / timezone difference that prevented human interaction between clients and developers, but also the lower quality of the software developed by the outsourcing companies and the massive job transfer. This had a negative impact on many aspects of the software engineering profession.

## I. Introduction

Software Engineering is concerned with

- **Technical processes of software development.**
- **Software project management.**
- **Development of tools, methods and theories to support software production.**
- **Getting results of the required quality within the schedule and budget.**

**Software Engineering is important because**

- **Individuals and society rely on advanced software systems.**
- **Produce reliable and trustworthy systems economically and quickly.**
- **Cheaper in the long run to use software engineering methods and techniques for software systems.**

## II. Software Automation

Software automation is the act of using insights to conceive, model and scale a solution to a problem software automation, software automation is the use of special software (separate from the software being tested) to control the execution of tests and the comparison of actual outcomes to predicted outcomes. Software automation can automate previous repetitive but necessary testing in a formalized testing process already in place, or add additional testing that would be difficult to perform manually. Automation provides companies with the means of staying competitive by automating simple and complex tasks across applications. Users realize a quick saving of both time and costs, increase business and IT process reliability and speed while reducing the possibility of human error. It can be

used to automate any kind of task, from the most complex to the very simple. Automate Windows applications, Web tasks or legacy applications. It is the only automation software you will need.

We will define following points on by one for completion of software automation.

- Generative Programming and Component Engineering** : Generative and component approaches are revolutionizing software development similar to how automation and components revolutionized manufacturing. Generative Programming (developing programs that synthesize other programs), Component Engineering (raising the level of modularization and analysis in application design), and Domain-Specific Languages (elevating program specifications to compact domain-specific notations that are easier to write, maintain, and analyze) are key technologies for automating program development.
- Distributed Computing** is a field of software automation that studies distributed systems. A distributed system is a software system in which components located on networked computers communicate and coordinate their actions by passing messages. The components interact with each other in order to achieve a common goal. There are many alternatives for the message passing mechanism, including RPC-like connectors and message queues. Three significant characteristics of distributed systems are: concurrency of components, lack of a global clock, and independent failure of components. An important goal and challenge of distributed systems is location

transparency.



- Examples of distributed systems vary from SOA-based systems to massively multiplayer online games to peer-to-peer applications. A computer program that runs in a distributed system is called a distributed program, and distributed programming is the process of writing such programs.

Distributed computing also refers to the use of distributed systems to solve computational problems. In distributed computing, a problem is divided into many tasks, each of which is solved by one or more computers, which communicate with each other by message passing.

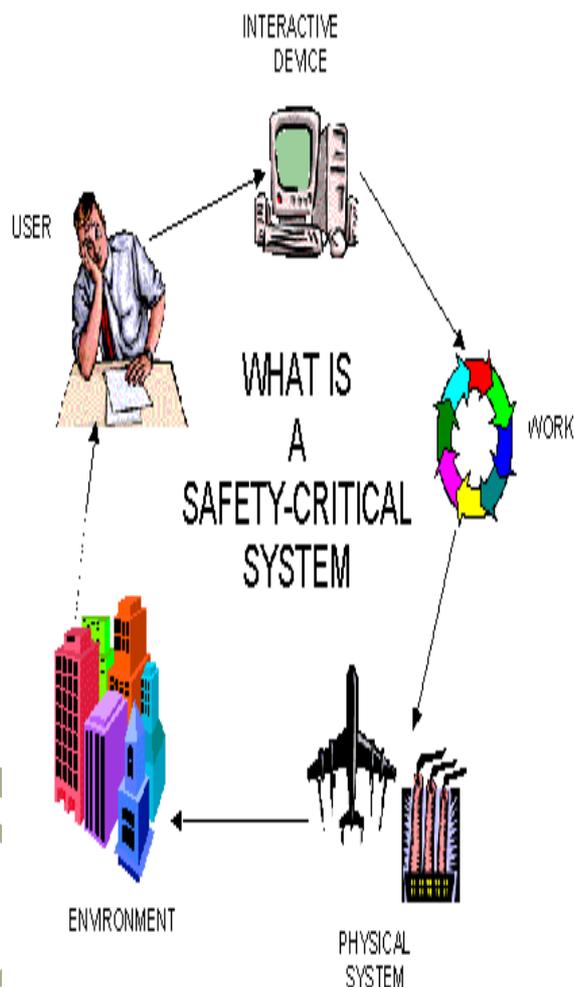
**Program synthesis** is a special form of automatic programming that is most often paired with a technique for formal verification. The goal is to automatically construct a program that provably satisfies a given high-level specification. In contrast to other automatic programming techniques, the specifications are usually non-algorithmic

statements of an appropriate logical calculus. Program synthesis is the task of automatically discovering an executable piece of code given user intent expressed using various forms of constraints such as input-output examples, demonstrations, natural language, etc. Program synthesis has direct applications for various classes of users in the technology pyramid.

### III. Dependability and Security

Safety-critical system is a Essential that system operation is always safe & System should never damage people or system's environment. Sample: control- and monitoring systems in aircraft, process control system in chemical and pharmaceutical plants, automobile control systems, in software control is essential we Need to manage large numbers of sensors and actuators with complex reduces the impacts of undesirable events on a project.

Risk management in any project requires undertaking decision-making.



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