A to Z of Model based Software Engineering

Ruchi Saxena
Computer science and engineering
SCSIT
Indore India

Abstract—Software engineering is a deep study of any software to design it in a proper manner. It mainly point to the low quality software which lacks in designing and development criteria. Whereas model based software engineering is a software development process which focus on software quality and testing as well.

Model based software engineering is a benefiting tool for many group of individuals namely software developers, software engineers and business analysts. The basic purpose of MBSE (model based software engineering) is maximizing the positive results through programs at different abstract levels The key idea of MBSE is to control of process of software development and this lead to a quality software. Most of the software code generation process follows standard tools and techniques but still it need to code some program manually so the overall aim of MBSE is to produce all code automatically.

In this paper, we will give brief of the introduction, concepts, issues, tools and technologies in MBSE. We also figure out difference between Process aware information system (PAIS) and Model based software engineering (MBSE).

Keywords—Model based software engineering (MBSE), Model driven Architecture (MDA), model driven software engineering, Process aware information system (PAIS).

II. ADVANTAGES OF MODEL BASED SOFTWARE ENGINEERING

Let’s learn some of the many advantages of Model based software engineering:

1. Model driven engineering is a perfect way to deliver better results through less coding and more functionality since it involves modification and not creating a program from the scratch.
2. As model based engineering provides a base already, it makes delivery of solutions faster and better.
3. Since the base blueprint of a program is already tested and operational, the chances of failure minimizes.
4. One monetary advantage of model driven engineering is that is reduces the cost and makes the solution finding profitable. MBSE makes purpose-programming cost effective and viable for both developers and businesses.
5. The model driven software engineering gives the engineers a wider time window to focus and learn on the complex tasks like functional technicalities.
6. MBSE also helps one to gain domain knowledge along with creation and modification of software.

III. SOFTWARE ENGINEERING MODELS

The SDLC model is a way of defining the complexity and productivity of any software. There are major six type of SDLC model divided into two group sequential and evolutionary models. In the below chart you can find all the major and most popular SDLC models

![Popular SDLC Model](image-url)
IV. TECHNIQUES OF MODEL BASED SOFTWARE ENGINEERING

Since model based software engineering requires splitting of the software into two parts to operate upon, there are three different techniques associated with it. Though the old and new methods vary transitionally, lets learn about the ones in operation in the tech world.

1. The first being, the Domain Specificity, is the kind of technique wherein the emphasis is put on creating codes that can be used in many other applications as well. The reusable components that are created in Domain Specificity MBSE includes DSLs, domain components and reference architecture.

2. The second technique of Model based software engineering is named Metamodelling. Metamodelling includes the creation of codes in meta (coding) language so that a system can understand and comprehend the information, that was earlier only understood by humans. The most commonly adopting areas of metamodelling are Model driven development and architecture based software development.

3. The last and third commonly used technique of model based software engineering is Iteration Transformation. Iterative Transformation involves simplifying an abstraction gap into groups and pairs which are all comparatively easier to be put to use and implement than the other parts. The need of iterative transformation arises when the source models are way too complex to generate codes for software development.

V. ISSUES AND CHALLENGES IN MODEL BASED SOFTWARE ENGINEERING

Like every other software creation technique and tool, model based software engineering also comes with its share of issue and challenges. MBSE is a great tool for software engineering, development and prototype creation but when it comes it lacks a precision when it comes to complex software development. It is because complex software require peripherals that can generate codes that appropriately handles multiple aspects of the software.

As the issues and challenges posed by using Model based software engineering are not much, the benefits must be appreciated for paving way to many technological advancement.

ACKNOWLEDGMENT

I thank to Dr. Ugrasen Suman professor SCSIT DAVV INDORE for assistance with software engineering, knowledge management & mining, service oriented computing. I also thank “anonymous” reviewers for their so-called insights.

REFERENCES

[1] Teaching Software Modelling in an Undergraduate Introduction to Software Engineering Date of Conference: 15-20 Sept. 2019 ISBN Information: Electronic ISBN: 978-1-7281-5125-0 Print on Demand(PoD) ISBN: 978-1-7281-5126-7 INSPEC Accession Number: 19157554 DOI: 10.1109/MODELS-C.2019.00105 Publisher: IEEE Conference Location: Munich, Germany, Germany

[2] ISO/IEC/IEEE Draft International Standard - Systems and software engineering – Methods and Tools for Model-based Systems and Software Engineering ISO/IEC/IEEE P24641_D2_CD, June 2020 Year: 2020 | Standard | Publisher: IEEE

[3] Advanced model-based software engineering technologies for software defined radio configuration C. Liu William; M. McNeill Kevin; Michael Cook; BasilKrikeles 2010 - MILCOM 2010 MILITARY COMMUNICATIONS CONFERENCE Year: 2010 | Conference Paper | Publisher: IEEE

[4] Model-Based Software Engineering: A Multiple-Case Study on Challenges and Development Efforts Conference Paper - October 2018 with 172 Reads DOI: 10.1145/3239372.3239404 | Conference: the 21th ACM/IEEE International Conference

[5] Chemiavsky, J.C., and Smith, C.H., 1991, “On Weyuker’s Axioms For Software ComplexityMeasures,” IEEE Transactions on Software Engineering, Vol. 17, No. 6, June, pp. 636-638

[6] M. Weiser, (1984), “Program slicing”, IEEE Trans. Software Engineering , Vol. 10, pp 352-357.

[7] Aprocess-based flexible unified model Of Software EngineeringWanjiang Han ; MaoQiang Song ; Lixin Jiang 2011 International Conference on Computer Science and Service System (CSSS) Year: 2011 | Conference Paper | Publisher: IEEE

[8] Advanced modelbased software engineering technologies for software defined radio configurationC. Liu William; M. McNeill Kevin; Michael Cook; BasilKrikeles2010 - MILCOM 2010 MILITARY COMMUNICATIONS CONFERENCE Year: 2010 | Conference Paper | Publisher: IEEE

[9] The Impact of the Model-Driven Approach to Software Engineering on Software Engineering Education Abdelwahab Hamou-Lhadj; Abdelouahed Gherbi; Jagadeesh Nandigam 2009 Sixth International Conference on Information Technology: New Generations Year: 2009 | Conference Paper | Publisher: IEEE