LowCode 2021: 2nd Workshop on Modeling in Low-Code Development Platforms

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Abstract—**Cloud-based low-code development platforms such as Google's AppSheet, Microsoft's PowerApps, OutSystems and Mendix have become increasingly popular over the last few years, owing to an increasing demand for bespoke, cost-efficient and reliable data-intensive (e.g., back-office) software solutions. Low-code development platforms are model-driven at their heart. Hence, closer interaction and cross-pollination are highly beneficial for the low-code and model-driven engineering communities. The LowCode workshop aims to bring together vendors and users of low-code development platforms with model-driven engineering researchers and practitioners and explore opportunities for technology and experience transfer and collaboration between them.**

Index Terms—**Low-code, No-code, Model-Driven Engineering**

I. INTRODUCTION

The growing need for secure, trustworthy and cost-efficient software as well as the availability of mature cloud computing infrastructures, and the high demand for professional software developers, have given rise to a new generation of low-code software development platforms, such as Google AppSheet and Microsoft PowerApps. Low-code development platforms promise the development and deployment of complete applications using graphical interfaces, and thus, only require small amounts of procedural code. This makes them accessible to an increasingly digital-native and tech-savvy workforce who can directly and effectively participate in the software development process, even if they lack a programming background.

The adoption of low-code development platforms is growing at a fast pace. As evidence, Gartner expects that "by 2024, low-code application development will be responsible for more than 65% of [business] application development activity"[1].

While low-code development platforms are in essence model-driven, there is little evidence that they make use of technologies developed in the Model-Driven Engineering (MDE) community [1], [2]. This highlights a need for increased cross-pollination between low-code developers and

model-driven engineering researchers [3]. Through the Low-Code workshop, the former can benefit from increased awareness of existing technologies that can be reused/adapted in the context of low-code development platforms, while the latter can appreciate challenges that current model-driven technologies fall short at and identify opportunities for further research.

II. GOAL OF THE WORKSHOP

At the heart of low-code applications, there are typically various *models* of the structure, the behaviour and the user interface of the application. Low-code application models need to be edited (using graphical and textual interfaces), validated, version-controlled, and eventually transformed or interpreted to deliver user-facing applications. As all of these activities have been of core interest to the MoDELS community over the last two decades, running a workshop on low-code software development at MoDELS is a very natural fit.

Objectives. The objectives of the LowCode workshop are to:
- bring together developers and users of low-code development platforms with MDE researchers and practitioners;
- explore the technologies that power contemporary low-code platforms;
- identify the open challenges that vendors and users of low-code development platforms face;
- identify solutions from the MDE community that may be ported/adapted in the context of low-code development.

Topics of interest to the workshop include:
- Technologies underpinning low-code development platforms
- Comparisons of classical MDE tools and low-code development platforms
- Low-code development platforms as a service
- Citizen/end-user software development
- Recommender systems for low-code development platforms
- Graphical and textual cloud-based editors
- Repositories of low-code development artefacts

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[1]e.g., cf. https://spectrum.ieee.org/tech-talk/computing/software/programming-without-code-no-code-software-development

- Low-code development platforms for data-driven applications
- Low-code development for and from mobile devices
- Interoperability issues between low-code development platforms
- Automation support in low-code development platforms
- Scalability in low-code development
- Collaborative low-code development
- Empirical studies on using low-code development platforms

III. SUMMARY OF THE WORKSHOP

In this second edition of the workshop, we solicited two types of papers: *(1)* regular research papers and *(2)* position papers. We received 13 submissions, out of which the following 11 were accepted for publication in the proceedings and presentation during the workshop:

- Barbara Lopes, Carla Ferreira and Sérgio Amorim. *Solution Discovery over Feature Toggling with Built-in Abstraction in OutSystems*
- Nitish Patkar, Andrei Chiş, Nataliia Stulova and Oscar Nierstrasz. *Interactive Behavior-driven Development: a Low-code Perspective*
- Dominik Schneider and Alexander Weinert. *Towards Automated Semantic Grouping in Workflows for Multi-Disciplinary Analysis*
- João Pacheco, Stoyan Garbatov and Miguel Goulão. *Improving Collaboration Efficiency Between UX/UI Designers and Developers in a Low Code Platform*
- João Ramalho, Hugo Lourenço and João Costa Seco. *From Builders to Editors: Bidirectional Transformations of Low-code Models*
- Alexander Bock and Ulrich Frank. *In Search of the Essence of Low-Code: An Exploratory Study of Seven Development Platforms*
- Qurat Ul Ain Ali, Benedek Horváth, Dimitris Kolovos, Konstantinos Barmpis and Ákos Horváth. *Towards Scalable Validation of Low-Code System Models: Mapping EVL to VIATRA Patterns*
- Michiel Overeem and Slinger Jansen. *Proposing a Framework for Impact Analysis for Low-Code Development Platforms*
- Fulya Gürcan and Gabriele Taentzer. *Using PowerApps, Mendix and Outsystems in Two Development Scenarios: An Experience Report*
- Arsene Indamutsa, Juri Di Rocco, Davide Di Ruscio and Alfonso Pierantonio. *MDEForgeWL: Towards cloud-based discovery and composition of model management services*

- Felicien Ihirwe, Arsene Indamutsa, Davide Di Ruscio, Silvia Mazzini and Alfonso Pierantonio. *Cloud-based modeling in IoT domain: a survey, open challenges and opportunities*

IV. WORKSHOP PROGRAM COMMITTEE

- Alessandra Bagnato, Softeam
- Luca Berardinelli, Johannes Kepler University Linz
- Loli Burgueño, Open University of Catalonia
- Antonio Cicchetti, Mälardalen University
- Federico Ciccozzi, Mälardalen University
- Juri Di Rocco, University of L'Aquila
- Antonio Garcia-Dominguez, Aston University
- Gregor Engels, University of Paderborn
- Ákos Horváth, IncQuery Labs
- Nicholas Matragkas, University of York
- Pedro J. Molina, Metadev S.L.
- Jean-Marie Mottu, Université de Nantes
- Joost Noppen, British Telecom
- Alfonso Pierantonio, University of L'Aquila
- Adrian Rutle, Western Norway University of Applied Sciences
- Matthias Tichy, Ulm University

V. ACKNOWLEDGEMENT

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[1] M. Brambilla, J. Cabot, and M. Wimmer, *Model-Driven Software Engineering in Practice, Second Edition*, ser. Synthesis Lectures on Software Engineering. Morgan & Claypool Publishers, 2017.

[2] J. Cabot, "Positioning of the low-code movement within the field of model-driven engineering," in *MODELS '20: ACM/IEEE 23rd International Conference on Model Driven Engineering Languages and Systems, Virtual Event, Canada, 18-23 October, 2020, Companion Proceedings*, E. Guerra and L. Iovino, Eds. ACM, 2020, pp. 76:1–76:3.

[3] M. Tisi, J. Mottu, D. S. Kolovos, J. de Lara, E. Guerra, D. D. Ruscio, A. Pierantonio, and M. Wimmer, "Lowcomote: Training the next generation of experts in scalable low-code engineering platforms," in *STAF 2019 Co-Located Events Joint Proceedings*, ser. CEUR Workshop Proceedings, vol. 2405. CEUR-WS.org, 2019, pp. 73–78.