PhD Student Vacancy for the Lowcomote Project

Scalable and Extensible Cloud-based Low-Code Model Repository

University of L’Aquila is hiring a PhD Student for its Lowcomote Project in L’Aquila.

The Lowcomote project

The MSCA ITN 2018 project Lowcomote will train a generation of experts that will upgrade the current trend of Low-code development platforms (LCPDs) to a new paradigm, Lowcode Engineering Platforms (LCEPs). LCEPs will be open, allowing to integrate heterogeneous engineering tools, interoperable, allowing for cross-platform engineering, scalable, supporting very large engineering models and social networks of developers, smart, simplifying the development for citizen developers by machine learning and recommendation techniques. This will be achieved by injecting in LCDPs the theoretical and technical framework defined by recent research in Model-Driven Engineering (MDE), augmented with Cloud Computing and Machine Learning techniques.

The Lowcomote project will train the first European generation of skilled professionals in LCEPs. The 15 future Early Stage Researchers (ESRs) will benefit from an original training and research program merging competencies and knowledge from 5 highly recognised academic institutions and 8 large and small industries of several domains. Co-supervision from both sectors is a promising process to facilitate agility of our future professionals between the academic and industrial world.

Partners

IMT Atlantique (FR), University of York (UK), Universidad Autónoma de Madrid (ES), University of L’Aquila (IT), JK University of Linz (AT), British Telecom (UK), Intecs (IT), Uground (ES), CLMS (UK), IncqueryLabs (HU), SparxSystems (AT), Metadev (ES), The Open Group (UK)

Training activities

The training program of Lowcomote aims at enabling the recruited ESRs to develop a broad range of scientific, technical and transferable skills that will prepare them for fruitful careers in academia and industry, namely thanks to training led by world experts in the field and timely and high-quality feedback by all co-supervisors.

In particular, the network will provide training for the three main competences needed for developing future LCEPs:

- MDE, for domain analysis, language construction and code generation;
- Cloud computing, for an efficient use of the Cloud infrastructure to manage a large number of users and artefacts;
- Machine learning, for building smart assistants for citizen developers.

Other training activities will include communication, career development and plan, and entrepreneurship.
Phd. research topic: Scalable and Extensible Cloud-based Low-Code Model Repository

Within the context of the Lowcomote project, the Phd candidate will work to the following specific research subject.

Objectives: Over the last few years, many MDE technologies have been proposed for developing domain specific modelling languages, and for supporting a wide range of model management activities. While existing MDE technologies provide practitioners with facilities that can simplify and automate many steps of model-based development processes, empirical studies show that some barriers still exist for the wider adoption of MDE technologies. Among the main issues that currently hamper a wider adoption of MDE are the following:

- the support for discovery and reuse of existing modelling artifacts is very limited. As a result, similar transformations and other model management tools often need to be developed from scratch, thus raising the upfront investment and compromising the productivity benefits of model-based processes. For instance, when modellers identify a need for a domain-specific modelling language, it is quite common to implement it from scratch instead of reusing already developed languages that might satisfy their requirements;
- modelling and model management tools are commonly distributed as software packages that need to be downloaded and installed on client machines, often on top of complex software development IDEs (e.g. Eclipse).

The objective of this project is to develop an extensible and scalable repository that can address the issues mentioned above in LCE contexts. During the project a set of core services will be developed to store and manage typical modelling artifacts and tools. Atop such services it will be possible to develop extensions adding new functionality to the repository (e.g., calculation of model metrics). Moreover, it will be possible to use all the services by means through a web interface and REST APIs that will permit to adopt the available model management tools as software-as-a-service. Finally, the repository will be also designed so to support machine learning techniques (e.g., collaborative filtering) with the goal of providing modellers with real-time recommendations.

Expected results: The project will develop a community-based model repository able to manage the persistence and reuse of heterogeneous modelling artifacts (including models, metamodels, and model transformations). The repository will support advanced query mechanisms and will be extensible in order to add new functionality, e.g. remote calculation of model metrics, semantic model differencing, validation and composition of model transformations, and even automated clustering of the stored modeling artifacts. Based on our preliminary results in we expect to store in the repository by the end of the project thousands of real modeling artifacts (including model transformations, metamodels, and models) collected during the development of Lowcomote.
Requirements

**Degree:** Master degree in Computer Science or equivalent providing access to PhD programs.

**Language:** English proficiency must be attested either through a previous English language diploma, or an internationally recognized proficiency test (at least C1 level of the Common European Framework of Reference for Languages i.e. IELTS, IBT, TOEFL or Cambridge).

**Career:** When starting their contract (September 2019), selected researchers should be within the first four years of their careers. This means being both within a four years window following their most recent graduation and not having been awarded a prior doctoral degree so far.

**Mobility:** At the time of recruitment, the researcher must not have resided, or carried out his/her activity in Italy for more than 12 months in the 3 years prior to recruitment date.

Employment conditions

Full-time Equivalent Position

**Duration:** 36 months, including 2 secondments of 3 months each at other consortium members’ premises (see Hosting institution section)

**Starting date:** 1st September 2019

**Remuneration:**
The gross remuneration will amount €3,200 (approx) with an extra family allowance, if applicable.

**Research, Training and Networking costs:**
All relevant expenses linked to the research and training activities (travel, accommodation, etc.) will be paid by the project budget.

Hosting institution

The University of L'Aquila (UDA) has 7 departments and the work carried out in this project will be based at the Department of Information Engineering Computer Science and Mathematics. UDA has developed a solid research and development experience in software engineering by mainly focusing on software architectures, model-driven development, evolution of open source software, component-based programming, internet-based programming, security and verification issues.

The ESR will be hosted at the MDE group at the DISIM (http://www.disim.univaq.it) department of the University of L’Aquila:

University of L'Aquila
Department of Information Engineering Computer Science and Mathematics (DISIM)
Via Vetoio
67100 L’Aquila (Italy)
The ESR will spend 2 secondments of 3 months at the premises of 2 project’s members as detailed in the following table.

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<tr>
<th>Planned Secondments</th>
<th>Hosting Partner</th>
<th>Start – End Date</th>
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<tbody>
<tr>
<td>1 Collection of industrial modelling artifacts to be used for fine-tuning the implementation of the model repository.</td>
<td>Metadev (Spain)</td>
<td>M18-M20 (June – August 2020)</td>
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<tr>
<td>2 Enabling the interaction of the DevOps technology developed in ESR9 with the model repository.</td>
<td>University Johannes Kepler of Linz (Austria)</td>
<td>M31-M33 (July – September 2021)</td>
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**Supervisors**

Davide Di Ruscio, [davide.diruscio@univaq.it](mailto:davide.diruscio@univaq.it)
Alfonso Pierantonio, [alfonso.pierantonio@univaq.it](mailto:alfonso.pierantonio@univaq.it)

**Application process**

All applications shall be sent before 15th April 2019 by filling in the form on the Lowcomote [https://www.lowcomote.eu/call/](https://www.lowcomote.eu/call/).

Applications are composed of the following documents in English (and when necessary a certified translation of official documents):

1. a complete CV with references to past research and training experiences;
2. a motivation letter highlighting the consistency between the candidate’s profile and the chosen ESR position for which they are applying;
3. at least 2 reference contacts (could be substituted by a reference letter, which should be in English or in certified translation)
4. scan of the degree qualification.
5. scanned copy of valid identification document (identity card or passport)
6. proof of proficiency in English (either through a previous English language diploma, or an internationally recognized proficiency test - at least C1 level of the Common European Framework of Reference for Languages i.e. IELTS, IBT, TOEFL or Cambridge).