



SmartCLIDE



OpenSmartCLIDE

The **SmartCLIDE project** enables organizations on the path to digitalization to accelerate the creation and adoption of Cloud and Big Data solutions. The innovative smart cloud-native development environment will support creators of cloud services in the discovery, creation, composition, testing, and deployment of full-stack data-centered services and applications in the cloud.

AT A GLANCE

Project title

Smart Cloud Integrated Development Environment supporting the full-stack implementation, composition and deployment of data-centered services and applications in the cloud

Project coordinator

- Institut für angewandte Systemtechnik Bremen (DE)
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Partners

- INTRASOFT International (LU)
- AIR Institute (ES)
- University of Macedonia (GR)
- Canter for Research and Technology Hellas (GR)
- X/OPEN Company (UK)
- Eclipse Foundation Europe (DE)
- Wellness Telecom (ES)
- Unparallel Innovation (PT)
- CONTACT Software (DE)
- KAIRÓS Digital Solutions (ES)

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EC Contribution:€4,935,381

Programme:H2020-ICT-2019-2

Further information:smartclide.eu
eclipse.org/opensmartclide



Context and motivation

The SmartCLIDE research project aims to bridge the gap between on-demand business strategies and the lack of qualified software professionals by creating a new cloud native IDE that makes it easier to develop and deploy cloud services. The project is funded by the European Union’s Horizon 2020 research and innovation program, and involves a consortium of 11 partners from Germany, Greece, Luxembourg, Portugal, Spain, and the United Kingdom.

SmartCLIDE extends Eclipse Theia to provide a development environment that makes it easy to create, compose, test and deploy data-centric full-stack services and applications in the cloud. In addition to providing high levels of abstraction at all stages (development, testing, deployment and execution), SmartCLIDE makes it easy for IaaS and SaaS service self-discovery.

The project covers the architecture, front-end and back-end services of the cloud-based IDE.

Challenge

In this context, when companies face the creation or composition of new services for their clouds, they are having three alternatives, each one being subject to different problems/limitations:

- 1. Development of services from scratch** enclose a high complexity due to the wide variety of technologies that shall be used in the whole stack. It is expensive and time consuming.
- 2. Creating new services by composition:** Existing marketplaces are tightly coupled to IaaS and PaaS providers, and they are not always uniformly classified or well documented, so the discovery of valuable and secure services are mostly a manual process and its validity is demonstrated by trial and error.
- 3. Pricing models** of public cloud providers are very complex since they combine different variables depending on the type of service. These variables can be time of usage, resources used (memory, storage, processing capacity), thousands of predictions obtained (in the case of machine learning algorithms), volume of data transferred and many more. This fact makes the calculation of costs extremely difficult to predict, and therefore to control.



Solution

Eclipse OpenSmartCLIDE project originated from the European SmartCLIDE [1] project. The concept for the IDE is described in [2], the architecture is described in [3]. All services developed within SmartCLIDE are open-source and are licensed under the Eclipse Public License 2.0 scheme.

OpenSmartCLIDE is based on Eclipse Theia, which provides all of the tools necessary for development. Theia consists of a rich interface with a vast range of features that accelerate deployment of cloud services, improve their quality, and expand the skills of novice and experienced developers.

The main features of OpenSmartCLIDE include:

1. Life cycle support. Software follows a life cycle, from feature specification to solution deployment. OpenSmartCLIDE provides the specific tools required at each life-cycle stage. For example, at the development stage, OpenSmartCLIDE provides data sources, data transformations, graphics visualization artefacts, and general-purpose abstractions and patterns that can be combined to implement features.
2. Insightful source code monitoring. OpenSmartCLIDE includes visualization features that help developers gain deeper understanding of the source code. It dynamically shows the meaning of expressions or code flow at low levels of granularity. It also allows developers to compare different software states, perform state changes that are reflected dynamically, and create new abstractions that can be easily reused.
3. CI/CD integration. OpenSmartCLIDE enables integration with widely used CI/CD tools such as GitHub and GitLab.

The Eclipse OpenSmartCLIDE also includes innovative features that leverage the power of a deep learning engine:

4. Development by demonstration and text notation. OpenSmartCLIDE automatically retrieves resources that are considered relevant for the new development. The end user can use text notation to enhance the description of the retrieved behaviour or algorithm. The deep learning engine then uses these notations to suggest programmatic solutions that result in the desired output.
5. Automatic software classification. The deep learning engine automatically identifies and classifies existing and new software abstractions that can be visualized in the IDE for reuse based on the purpose or behaviour defined by the end user.
6. Continuous integration and deployment assistance. End users are guided through each life cycle stage, ensuring the code generated has been properly tested, accurately integrated within the corresponding development branch, and automatically deployed in the selected cloud service. These capabilities align with the end-to-end responsibilities associated with the DevOps philosophy.

Impact

We can already list four major impacts resulting from this research project:

- **IMPACT 1.**
Contribute to the development of an ecosystem that will respond to the future digitisation needs of industry and the public sector. SmartCLIDE IDE provides the baseline for the establishment of an ecosystem of cloud service creators that will be able to share services and applications that can be automatically deployed in the cloud.
- **IMPACT 2.**
Assist the development of new cloud-based services and infrastructures in Europe and foster an industrial capability in the cloud computing sector. The disruptive technology proposed by SmartCLIDE based on the coding-by-demonstration principle, will allow users with low technical skills to create and securely deploy data intensive services of the highest quality.
- **IMPACT 3.**
Create new opportunities to encourage European-based providers, in particular SMEs, to develop and offer cloud-based services based on the most advanced technologies. SmartCLIDE proposes the utilization of existing open-source code to create the baseline upon which the new IDE will be developed, optimizing the use of technological resources and the need of investments to further develop the solution, facilitating the access of SMEs to the technology.
- **IMPACT 4.**
Leverage research and innovation projects to support the development and deployment of innovative cloud-based services and next generation applications, for the public and private sectors (including standardisation and applications for Big-Data and other sector-specific applications).

Links

- [1] <https://smartclide.eu>
- [2] D1.4 SmartCLIDE Concept
(https://smartclide.eu/?smd_process_download=1&download_id=1555)
- [3] D1.5 SmartCLIDE Architecture
(https://smartclide.eu/?smd_process_download=1&download_id=1558)

Eclipse OpenSmartCLIDE
<https://eclipse.org/opensmartclide>

Open source code
<https://github.com/eclipse-opensmartclide>