Application extensibility and customization - Indico's case

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Indico is a general-purpose event management system currently in use by more than 150 institutions world wide. Despite having been born at CERN and primarily adopted by the High Energy Physics Community, it has recently gained adoption in other communities (for example, the United Nations and its agencies) and received the attention of commercial vendors world wide. This growth in adoption implied finding better ways to customize the system to the needs of each individual organization. The application is written in Python and uses the Flask web framework, as well as SQLAlchemy as an ORM to PostgreSQL.

Indico 2.0 brings improvements that make it an easily configurable application, starting from a simpler installation process and customizable user interface using CSS and a templating language; and ending with a plugins system providing easy solutions for developing custom plugins, which allow for functionality to be added without changes in the application's core. The project's philosophy has always been that of "simplicity by default" and "optional complexity".

In this paper we will explain in detail the mechanisms we put in place in order to make Indico more extensible, configurable and easy to customize; we will describe some of the technical challenges that creating a feature-complete yet flexible web application involves and some of the technical solutions we have found and which can be reused by others. We will also detail the approaches that led to the development of flask-pluginengine and flask-multipass, two standalone modules that implement most of the application's extensibility and which can be reused by any Flask application. Finally, we will go over the parts of the tool suite which powers Indico, including the alembic-based migration utility and the asset generating pipeline, and analyze the implications this work had on them.

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