

# INDICO - the software behind CHEP 2004

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## Abstract

At the end of the year 2003, the Programme and Local Organising Committees of the Computing in High Energy Physics conference 2004 decided to use the InDiCo platform [1] as the computing support for the event. At this time, the Integrated Digital Conferencing project was proposing its first implementation of a web application for organising conferences.

In this article, we will explain some details of InDiCo software, how it has been conceived and how it has been validated throughout the organisation of CHEP04.

## A EUROPEAN PROJECT

### Conferences on the Web

The very first conference to use the Web as a medium for information dissemination and management was the HEP conference taking place in Marseilles on March 1993. Its URL - <http://marcal1.in2p3.fr/WWW/conf.html> - is of course (unfortunately) broken today. Looking at conferences organized in the 90's, it appears that conference web sites have a very short lifetime while the scientific content exposed in these conferences is recognized at a very high value.

Number of conferences organized in HEP according to both:

- CERN Conference Announcement database covering High Energy Physics and related topics[2]
- SLAC Library database (US) focusing on High Energy Physics only[3]

gives an average of 100 conferences per month, half of them in Physics and half in other related domains like Detectors, Accelerators, Cosmology, Engineering, etc. (4,736 HEP and HEP-related conferences organised between 2000 and 2003 !).

Of course, multiple software for handling a conference on the net already exist and most of the organizers are actually developing their own temporary set of pages and scripts. A thorough study of these solutions were carried out before we (and the European Commission) were convinced of the need for a new solution that will cover the following major issues:

- Managing all possible parts of the organization of an event, from its announcement to its archival.

- Supporting simple meetings as well as many-weeks workshops
- Offering facilities to record and keep Multimedia material (videos)
- Organising, classifying and retrieving multiple conferences, re-using past events
- Ensuring all the conference description and attached material can be transferred to electronic archives designed for long-term preservation

InDiCo was therefore mandated and financed by EU to provide a scalable solution to the new arising challenges that the electronic document management has to face in this early 21st century: the electronic preservation and the handling of multimedia content for the always increasing number of scientific conferences.

### Background: the Agenda-Maker

If the study of existing products and many interactions with conference organizers have come to reinforce the understanding of the need, our primary knowledge of it comes from our own experience with CERN Agenda-Maker application.[4]

One of the first and most advanced software for managing agendas of conferences was launched at CERN six years ago. Requested by the huge physics collaboration (ATLAS), it natively aimed at managing agendas of regular "one week series of working meetings". This Agenda-Maker tool turned out to be used extensively by many universities and for various kinds of meeting management.

Table 1: Usage of Agenda-Maker

Year	No of talks
1999	1,002
2000	2,765
2001	5,462
2002	12,037
2003	20,202
2004 (Sep)	21,263

On Septembre 2004, it hosts a total of 62,731 talks with 85,000 attached documents (transparencies, videos, etc). Its exponential usage, with almost no advertisement, shows the true need for a platform that helps users to deal with the basic parts of the conference management process.

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## SOME FEATURES

With INDICO, the number of possibilities for end users and for managers is so large that we will only focus here on the main features. Modules that were tested, refined and validated during the whole process of the CHEP04 organisation are described below.

### *Reusability*

Designers and developers of InDiCo have built the requested options in a generic way, in order to guarantee the usefulness of these tools for all future conferences using the system. Already at this day, the 10th Workshop on Electronics for LHC and future Experiments [5], the International Conference on Accelerator and Large Experimental Physics Control Systems (ICALEPS) [6] and many other conference organisers are looking at the InDiCo solution.

The software itself, delivered as Open Source, has also been installed in a few institutes other than CERN, like the Technical Knowledge Center of Denmark (DTV) or the Laboratory of Linear Accelerator (LAP) in France, where needs for similar features are emerging.

### *Display Multiple Views*

Different views can be proposed for each event stored in the system. This is particularly useful when different groups of users share the same InDiCo server and want to display their own meetings in different ways. For the administrator, adding a new view is as simple as writing an XSL stylesheet.

### *Show Overview and Calendar*



Figure 1: InDiCo categories at CERN.

A single installation of the software can host several meetings. The meetings can be classified in a tree of categories. The information can be found by navigating the categories or through time-driven displays. A calendar display shows the list of meetings taking place over one or

several months in different categories. An overview display shows the list of meetings taking place on one precise day, week or month under one specific category. These display options provide the user with all the tools needed to easily retrieve the information.

### *Call for Material*

The conference organisers can set up a "Call for abstract" which allows authors to directly submit abstracts in InDiCo. Once his abstract has been approved, an author can himself upload material files (paper, slides...) which are then attached to his talk.

### *Manage Timetable*

A very complete time table management module is delivered with InDiCo. Various useful tools help the conference organisers to set-up a fully detailed conference programme.

### *Create Personal Accounts*

Personal accounts are created using a simple login mechanism (which can be based on a local authentication solution). Each user can then be presented with customized interfaces, thus facilitating its interaction with the system. The personal accounts are also used to grant each user access or modification rights and some specific roles (speaker, session convener, conference organiser...)

### *Protect and Delegate Access Rights*

InDiCo provides an easy way of protecting each item in a conference (ranging from the conference as a whole to a single file). This fine-grained protection mechanism can be password, user or domain based.

### *Select Contributions*

A full reviewing process has been integrated in InDiCo. The powerful user delegation mechanism allows conference managers to nominate reviewers for each track in the conference. Submitted abstracts can then be commented, judged, proposed for acceptance/rejection or for a change of track. Accepted abstracts are then transformed into actual contributions and they can be inserted in the timetable of the conference.

### *Produce Printable Outputs*

Different PDFs can be created at different stages of the conference organisation: list of submitted abstracts, the list of speakers, final book of contributions, daily schedules...

XML is another available export format which allows easier inter-software exchanges.

An export in iCal format provides the users with a convenient way of automatically feeding their own personal scheduler tool.

## Declare Content as Open Archive

InDiCo is compliant with the standard OAI-PMH protocol [7]. It provides a native OAI (Open Archive Initiative) gateway for exporting data of conferences. Conference managers are free to choose whether to expose their conference data or not. OAI service providers, like digital libraries, can then harvest the InDiCo server and retrieve the exposed conference data.

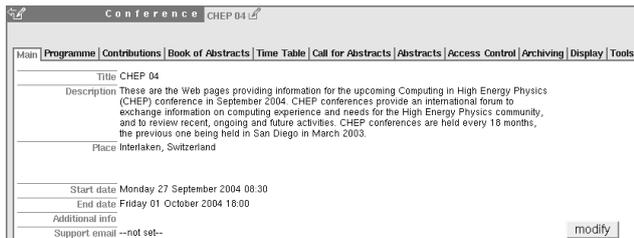


Figure 2: InDiCo management interface.

## TECHNOLOGY

InDiCo development has been fully based on the object-oriented (OO) paradigm, using technologies related to this field. The final product therefore benefits from all the advantages of the OO approach. Besides, we have set up and followed a light weighted software development process based on RUP [8] which allows to develop and release software with good quality control.

Standards have been used as much as possible in all parts of the development cycle. One of the requirements of InDiCo was that it should be released under an open source compatible license and therefore, most of the products and standards chosen to develop it have been selected according to this requirement. Today, InDiCo is released under GPL license [9] and it has been installed and tested successfully on various platforms (Linux, Windows).

### Software architecture overview

Architecture design has been driven by the requirements that have the greatest impact on the system. Among them

- the need of different interfaces to the system
- the domain problem issues themselves
- the possibility to easily extend the system with new features.

InDiCo uses a classical multi-layered architecture where dependencies go only in one direction allowing logical separation of components and re-usability of "lower" layers.

The interfaces layer hosts the different interfaces the system supports; the layered architecture allows you to easily extend the system by adding new interfaces if needed. The business layer contains machinery directly related to the problem domain. The system layer provides an abstraction for object persistence and multimedia repository.

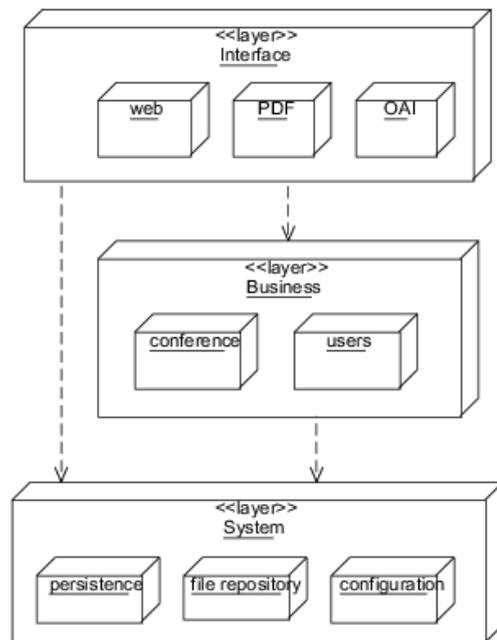


Figure 3: InDiCo architecture overview.

The result is an architecture that can be extended without affecting other parts of the system and any layer could eventually be redesigned or replaced with very small impact on the others.

### Python powered

Python was selected as the InDiCo development platform because it has unique features like its high-level, dynamic data typing and a reduced learning curve that fit very well into the project requirements and development process.

The core system is running in Python using very few third-party modules (other than aspects the standard library could not cope with) and following an OO approach. One peculiarity of this system is that the persistence machinery is true OO, as it relies on ZODB [10]. This database is fully developed in Python too so that it provides at the same time a unique integration with the programming language and a complete compliancy with the OO paradigm. It has allowed us to reduce the development time and adapt to the constant changes in the requirements in a smooth way.

The main problem we have faced for building the web-based part of InDiCo is the lack of a standard application server for developing Python based web applications. Therefore, we evaluated different possibilities and decided to deploy InDiCo over a combination of Apache HTTP server [11] and mod-python [12] which allows high performance and multi-platform support. However the system architecture is designed in such a way that the system could be deployed in any other application server without much effort.

The web interface has been developed following latest HTML standards, avoiding dynamic technologies in order

to keep the maximum compatibility with all browsers. For the generation of reports and printable lists, InDiCo is using ReportLab [13] that is deployed as a Python package and generates PDF documents in a very efficient and simple manner.

## CONCLUSION: BENEFITS OF USING INDICO

It is important to point out some of the major benefits (not always easy to quantify) of using a professional platform like InDiCo when organizing conferences:

- Save time thanks to:
  - Centralized software support in the management of large-scale events;
  - more efficient organization of conferences;
  - efficient e-collaboration with communication through different electronic channels, e.g. via mass e-mails and conference Websites;
  - professional, standardized workflow related to the conference
- Save money thanks to:
  - no printing costs, thanks to e-publishing, archiving on the Web, etc.;
  - no need to purchase software or an expensive software license;
  - no costs associated for each conference with servers, data storage capacity, data security, data backups, updates and releases (as this is centralized);
  - no costs for personnel recruitment, salaries and workplaces for in-house IT specialists
- Ease the life of end-users thanks to:
  - access to specialized software, even on a one time-only basis;
  - always the latest technology at one's disposal;
  - no need to worry about software licenses;

The centralization of electronic conference management is an obvious direction to follow in the future in order to guarantee the e-conference quality, the long term availability of its content, easy retrieval of its information and considerable financial savings related to computing. CHEP 2004 using InDiCo has taken the first step in this direction.

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## REFERENCES

- [1] Indico at CERN <http://indico.cern.ch/>
- [2] CERN Conference Database <http://cdsweb.cern.ch/?c=Conferences>
- [3] SLAC Conference Database <http://www.slac.stanford.edu/spires/conferences/>
- [4] Agenda-Maker <http://agenda.cern.ch>
- [5] LHC Workshop <http://lecc2004.bu.edu/>
- [6] ICALEPS <http://indico.cern.ch/conferenceDisplay.py?confId=043>
- [7] Open Archive Initiative: <http://www.openarchives.org>
- [8] Rational Unified Process, described among others in "The Unified Software Development Process" by Jacobson, Booch and Rumbaugh.
- [9] GNU General Public License defined at <http://www.gnu.org/copyleft/gpl.html>
- [10] Zope Object Database <http://www.zope.org/Wikis/ZODB/FrontPage>
- [11] Apache HTTP Server <http://httpd.apache.org/>
- [12] Mod Python <http://modpython.org/>
- [13] ReportLab <http://reportlab.org/>