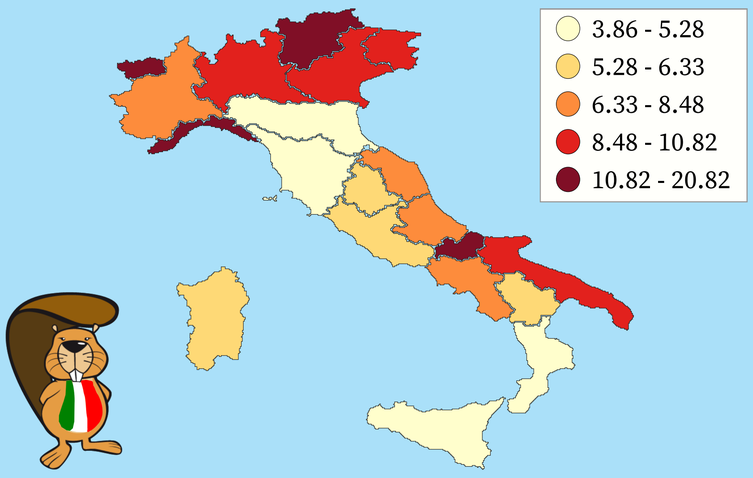
A platform for the Italian Bebras

Carlo Bellettini, Violetta Lonati, Riccardo Macoratti,
Dario Malchiodi, Mattia Monga, Anna Morpurgo
Università degli Studi di Milano, Milan, Italy

Fabrizio Carimati *Incanet s.r.l., Italy*

Bebras in Italy

The **Bebras International Challenge on Informatics and Computational Thinking** is a contest open to pupils of all school levels (from primary up to upper secondary): about 2 million participants worldwide, in Italy 12 114 teams in 2017, ≈ 25 000 in three editions.



Permillage of school pupils participating to the Italian Bebras in 2017

The platform has different users

- **Before the contest:** organizers prepare the tasks; teachers sign up, register teams; guests can try the tasks proposed in previous editions.
- **During the Bebras week:** teams access the tasks and submit their answers; organizers and teachers can monitor the situation of teams.
- **After the contest:** *task answers are evaluated*; organizers analyze collected data; teams can display tasks together with the answers they submitted, (one of) the correct solution(s), an explanation and hints for further in-depth study; teachers can display the total scores of all their teams and print attendance certificates.

Collecting events

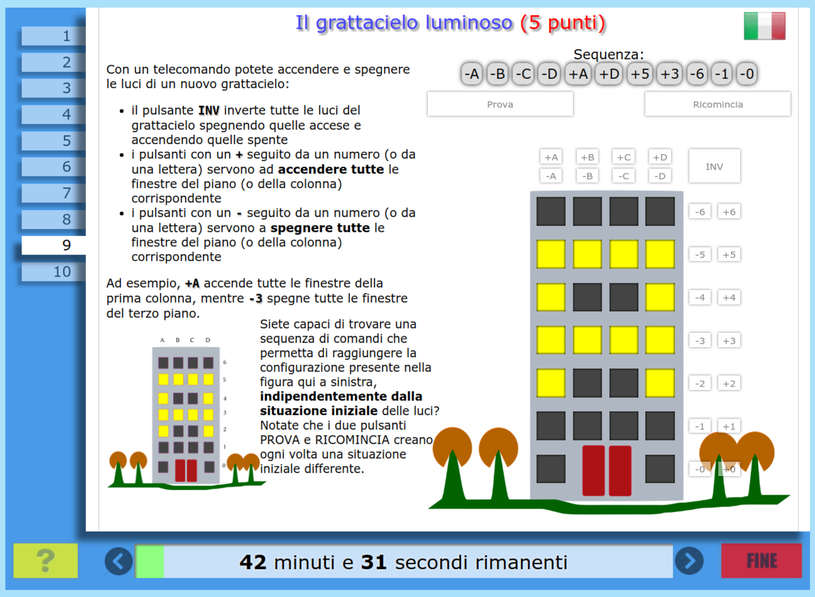
Time	Event	Data
2.63	enter	{}
26.65	change	{"key":"answer","value":"-A"}
30.48	change	{"key":"answer","value":"-A,-C"}
31.42	change	{"key":"answer","value":"-A,-C,-B"}
32.19	change	{"key":"answer","value":"-A,-C,-B,-D"}
34.96	change	{"key":"answer","value":"-A,-C,-B,-D,+5"}
36.74	change	{"key":"answer","value":"-A,-C,-B,-D,+5,+3"}
38.7	change	{"key":"answer","value":"-A,-C,-B,-D,+5,+3,+A"}
39.75	change	{"key":"answer","value":"-A,-C,-B,-D,+5,+3,+A,+D"}
41.11	change	{"key":"answer","value":"-A,-C,-B,-D,+5,+3,+A,+D,-6"}
43.22	change	{"key":"answer","value":"-A,-C,-B,-D,+5,+3,+A,+D,-6,-0"}
43.9	change	{"key":"answer","value":"-A,-C,-B,-D,+5,+3,+A,+D,-6,-0,-1"}
46.47	leave	{}

Bebras platform for online tasks

A Bebras task is a fun little problem, solvable in ≈ 3 minutes, suitable to reflect on informatics and to exercise computational thinking skills.

Often *sophisticated tasks*, with **rich interactions** and, possibly, partial scores.
For example in the task on the right:

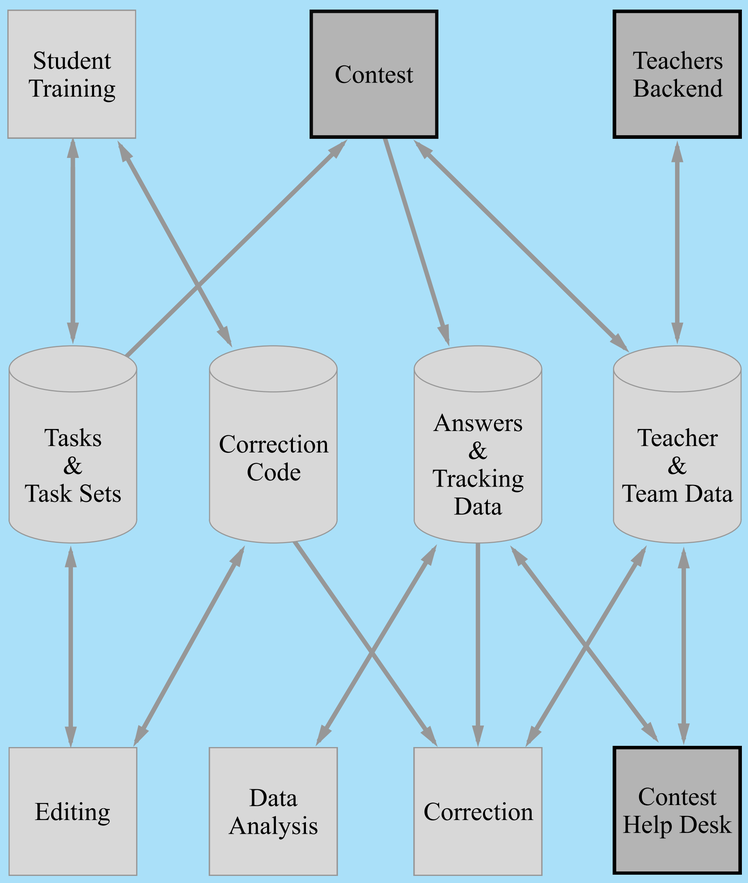
- buttons to switch off/on rows or columns of lights
- initial state of the windows change at every trial and it is in fact unpredictable
- a sequence of switch operations has to be inserted



Life cycle of a task

1. The tasks are conceived by a member of the Bebras community, and revised during the annual Bebras Workshop.
2. A set of tasks is selected, adapted and translated; in particular some kind of animation, interaction or feedback is planned for most of the tasks.
3. Each selected task text is collaboratively edited and inserted into the platform with its explanation and the coding of the interactive components.
4. Teams play with tasks and insert answers; when the time expires, answers are submitted with tracking data.
5. Answers are automatically evaluated and scores are assigned to teams; the scripts to evaluate answers and assign scores is usually implemented before the contest.
6. Teams can look at their score, display tasks, and compare the answers they submitted with the proposed correct solution and related comments.
7. Answers and tracking data are analyzed in order to study perceived difficulties, preferred tasks, differences among age levels, and other relevant issues.

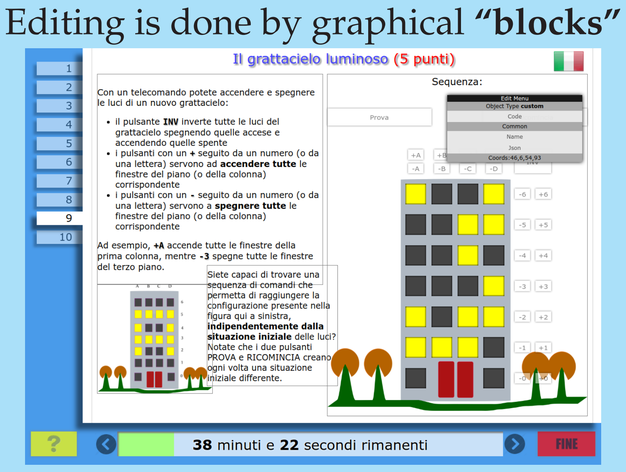
Server architecture



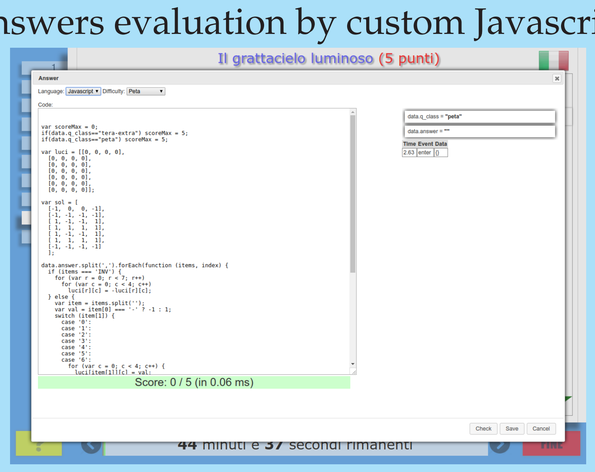
"LAMP" architecture based on PHP and MySQL, hosted on AWS; JSON data exchange.

Task editing

Editing is done by graphical **"blocks"**



Answers evaluation by custom Javascript



Acknowledgements

The authors thank the international Bebras community and all the schools which took part in the contest.

http://aladdin.di.unimi.it

ALADDIN
Dept. of Computer Science
Via Comelico, 39
20135 Milan — Italy