The SCORE 2009 Contest: a brief summary

The Student Contest in Software Engineering (SCORE) is a novel initiative that took place as part of the 31st International Conference on Software Engineering (ICSE 2009). SCORE is a worldwide competition that is targeted to students at the undergraduate and master's level. It emphasizes the engineering aspects of software development, as opposed to a narrower view that tends to reduce the endeavor to programming.

Student teams participating in the contest have been able to choose from a number of project topics proposed by the SCORE Program Committee, which cover diverse application fields and types, both industrial and academic.

Every project topic had one or more *reference persons* (*stakeholders*) in the SCORE Program Committee, to whom questions regarding the desired outcome of the project could be addressed.

To enhance synergies and cooperation between the SW engineering and the FM communities, the organizers of SCORE proposed to FME to sponsor the initiative. The sponsorship was accepted by the FME board and was implemented as a special award for the team that in its project exploited at best Formal Methods.

SCORE's detailed organization took place starting in the fall of year 2006 and has been articulated along the following timeline:
December 2007: Publication of the project topics on the SCORE website.
December 2007-November 2008: Registration open for teams intending to participate in the contest. When registering, teams had to indicate which project topic they were developing, and a contact person.
February 2008: Teams may start to submit summary reports (submission open).
November 2008: Registration for participation closed.
Mid January 2009: Submission for the summary reports closed.
Mid February 2009: selection of the best teams, among which the finalists of the contest are to be selected. The best teams have been asked to submit a final deliverable, which has been the basis for the selection of the finalists.
End of February 2009: Deadline for the submission of the final deliverable.
End March 2009: Announcement of the finalists who have been invited to ICSE 2009.
ICSE 2009 (May 2009): Final evaluation and presentation of the awards during ICSE09.

SCORE's Program Committee

Co-chairs: **Mehdi Jazayeri** (University of Lugano) and **Dino Mandrioli** (Politecnico di Milano)

Judith Bishop, University of Pretoria, South Africa
Jaelson Castro, Universidade Federal de Pernambuco, Brazil
Antonio Cerone, UNU-IIST, Macau

Giovanni De Toni, Parvis, Italy
Stuart Faulk, University of Oregon, USA
Miguel Felder, Pragma Consultores, Argentina
Carlo A. Furia, Politecnico di Milano, Italy
Connie Heitmeyer, Naval Research Laboratory, USA
Katsuro Inoue, Osaka University, Japan
Pankaj Jalote, IIT Delhi, India
Xiaoping Jia, DePaul University, USA
Michele Lanza, Università della Svizzera Italiana, Switzerland
Timothy C. Lethbridge, University of Ottawa, Canada
Dan Paulish, Siemens Corporate Research, USA
Nico Plat, West Consulting BV
Matteo Rossi, Politecnico di Milano, Italy
Tetsuo Tamai, University of Tokyo, Japan
Alan Wassyng, McMaster University, Canada
Michal Young, University of Oregon, USA

Stephen Fickas, General Chair of ICSE 2009 acted as liason for SCORE's inclusion in the ICSE 2009 program.
Nico Plat acted as liason with the FME board and managed in particular the evaluation of projects exploiting FMs.

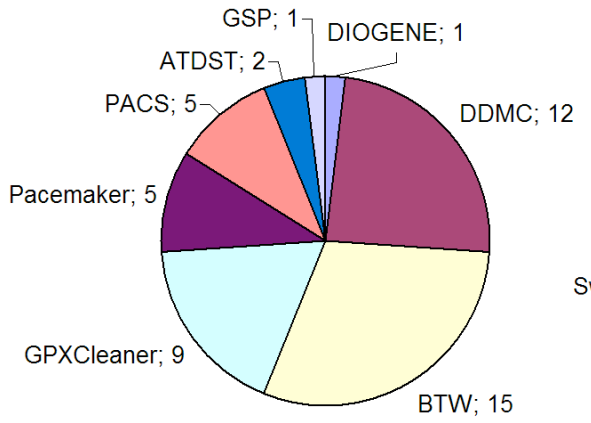
Proposed projects

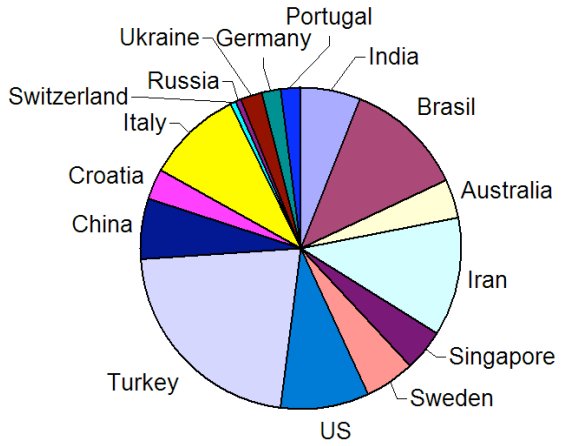
The following projects have been proposed by the PC and posted on SCORE's web site (some of them have been later cancelled due to problems generated within the industries that proposed them):

- **A Simple Pacemaker Implementation**
- **Personnel Access Control System (PACS)**
- **Global Studio Project (GSP), sponsored by Siemens**
- **Awareness Tool for Distributed Software Team (ATDST), sponsored by MS**
- **Design Rationale Investigation Tool, sponsored by MS**
- **GPS path editing and simplification (GPXCleaner)**
- **Distributed Decision in a Mobile Context (DDMC)**
- **DIOGENE: Digital I/O GENerator Engine**
- **BTW: if you go, my advice to you**

Submissions and selection

50 teams registered to SCORE within the deadline of November 2008.
This performance was considered as "good enough" for the first instance; more than 100 were not expected and would have stressed the "system" too much; in that case the PC chairs were ready to enlarge the PC.
The figure below displays how they were distributed: whereas it appears a good balancing among the proposed projects (left side of the figure), it is also clear a fairly uneven and somewhat surprising distribution among different countries.



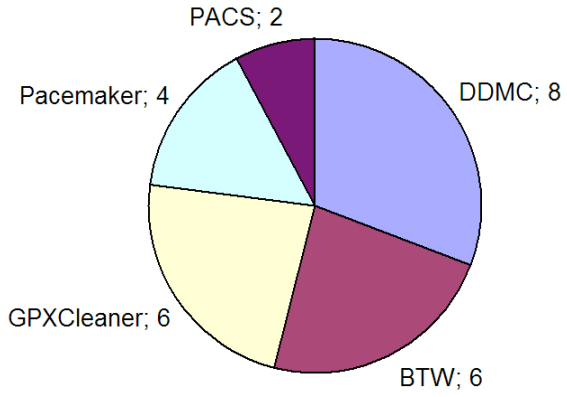


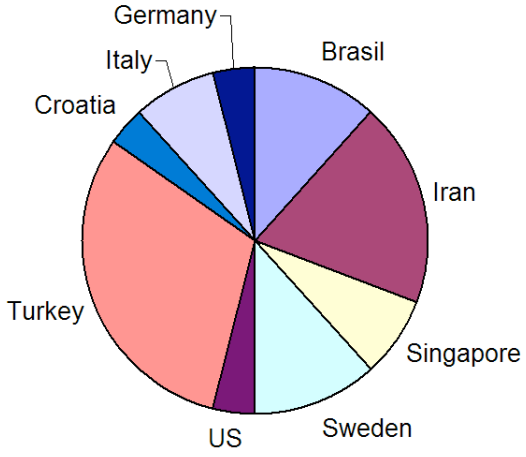
Among the registered teams only 26 submitted their report at the deadline of January 15. Although some reduction was natural, this was a little more than expected. Some non-systematic inquiries on the reasons for such a strong self-selection suggested the following hypotheses:

- Time pressure and conflicts with other school's assignments (e.g., other exams)
- Excessive self-criticism and pessimism on the chances of success
- Managing problems in ambitious teams that were geographically distributed but fail to coordinate effectively.

All in all there is no evidence that the 24 self-excluded teams all did do a poor work not worth submitting.

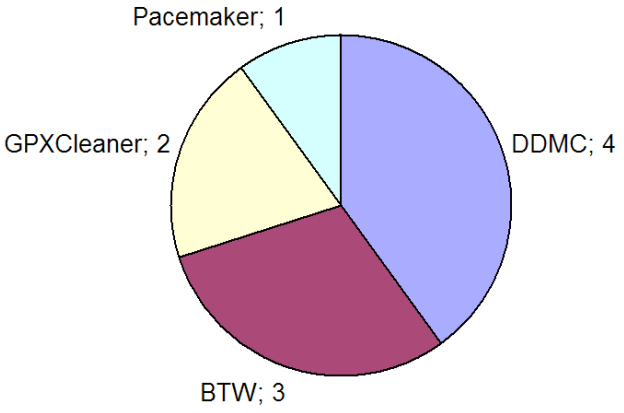
The distribution of the 26 teams among projects and countries is presented in the figure below.

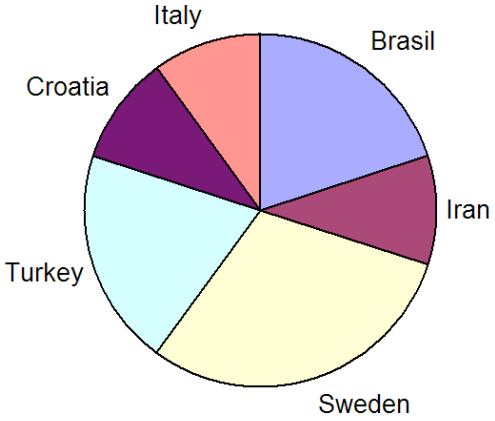




Seven of them declared they have been exploiting FMs. Also the others were inspected for possible "hidden use" of FMs; but only 2 of them were considered making real use of FMs.

On the basis of the review of the delivered reports 10 teams have been admitted to the second phase, which asked them for delivering full documentation of their work, including requirements analysis, architectural design, ***running code,*** ready to be installed, verification, etc.
Perhaps surprisingly, they all delivered full material in time; most of them showed a genuine effort to adjust the final deliverable according to the suggestions provided by the reviewers. All in all the quality of the delivered material was considered of excellent level.
The distribution of these 10 teams among projects and countries is presented in the figure below.





Unfortunately, among them only one was evaluated to make use of FMs in a satisfactory way.
Finally, on the basis of a thorough review of all the delivered material,

6 teams were selected for the finals, namely:

- Kaan Yucer, Mahmud Resid Cizmeci, Ilkay Ozan, Kaya Elif, Akan Fatma, Ekici Ali Karasu (students at Bogaziçi University in Turkey) who worked on the project *Distributed Decision in a Mobile Context*.
- Jenis Kavadiya, Avijit Dutta, Farahnaz Yekeh, Rishabh Gupta, Aparna Vijaya, and Sajjad Ali Khan (students at Mälardalen University in Sweden) who worked on the project *Distributed Decision in a Mobile Context*.
- Valerio Panzica La Manna, Andrea Tommaso Bonanno, and Alfredo Motta (students at Politecnico di Milano in Italy) who worked on the project *A Simple Pacemaker Implementation*.
- João H. C. Pimentel, Clarissa C. Borba, and Laís Xavier (students at the Federal University of Pernambuco, Brazil) who worked on the project *BTW: if you go, my advice to you*.
- Nikola Tankovic, Sonja Milicic, Danijel Zovic (students at the University of Zagreb in Croatia), Gianluigi Ciambriello, Savino Ordine, and Zafar Bhatti Ahmad (students at Mälardalen University in Sweden) who worked on the project *BTW: if you go, my advice to you*.

- Tin Tvrtkovic, Tihomir Bregovic, Josip Labor (students at the University of Zagreb in Croatia), Federico Ciccozzi, Jenny Jutterström, Pablo Santibañez Jara, and Coen Tempelaars (students at Mälardalen University in Sweden) who worked on the project *GPXCleaner: GPS Path Editing and Simplification*.

Among them the only remaining candidate the FM award was the team from Politecnico (obviously Politecnico's PC members for set up a conflict with that project during the selection phase.)

ICSE 09, with the financial contribution of FME' sponsorship supported travel expenses of one participant per team; free registration was also granted to all team members attending to ICSE.

The finals took place during ICSE at Vancouver. The following teams have been awarded with a cup and all finalist teams received a formal certificate acknowledging their performance:

- **SCORE's global winner:** Nikola Tankovic, Sonja Milicic, Danijel Zovic (students at the University of Zagreb in Croatia), Gianluigi Ciambriello, Savino Ordine, and Zafar Bhatti Ahmad (students at Mälardalen University in Sweden) who worked on the project *BTW: if you go, my advice to you*.
- **Award for the best undergraduate team**: Kaan Yucer, Mahmud Resid Cizmeci, Ilkay Ozan, Kaya Elif, Akan Fatma, Ekici Ali Karasu (students at Bogaziçi University in Turkey) who worked on the project *Distributed Decision in a Mobile Context*.
- **Special FMs award:** Valerio Panzica La Manna, Andrea Tommaso Bonanno, and Alfredo Motta (students at Politecnico di Milano in Italy) who worked on the project *A Simple Pacemaker Implementation*.

Conclusions

This first edition of SCORE was unanimously considered a great success. In particular, the quality of the products, mainly but not only those that have been admitted to the finals, has been considered as of surprisingly high level. The enthusiasm of all teams and the happiness of the winners was by itself a major reward for the whole PC.
The organizing committee of ICSE 2011, to be held in Honolulu, Hawai, is strongly in favor of arranging a second edition of SCORE. In such a case some directions for improvements and better success are the following:

- Increase the number of participants. It has been realized that numerous universities did "try" some SCORE projects but did not submit the results to the PC, just to "see what happens in the first instance". Particular attention should be paid to the uneven and somewhat surprisingly geographical distribution of the first instance.
- Assuming that a special track devoted to FMs exploitation will be re-instantiated –perhaps with other and new special tracks- we wish a greater involvement of the FM community –mainly by encouraging students to participate- in such an endeavor with the important goal of increasing the synergies between the two communities.