

## PROJECT PUMASCOPE BENEFITS BOTH STUDENTS AND RURAL EDUCATORS

Training is sorely needed in the South African context. To help address this need, the Department of Computer Science at the University of Pretoria has, for the past three years, run a community-based project called PumaScope in the rural areas of Mpumalanga. The aim of this project is to facilitate computer skills knowledge transfer to both teachers and learners in rural schools.

In doing so, the Department of Computer Science, in association with the project sponsors, attempts to prepare more learners from these communities to enrol for a degree programme in the Department. Students from the Department of Computer Science spend two weeks of the June/July university holiday at the schools.

During the past year the project focused on training educators at schools. Training covered setting up networks, troubleshooting, using various Microsoft programmes, how to run a computer lab and how to utilise IT to improve and support their teaching methods, as well as how to enhance the administration of the teaching process.

Schools that were targeted during this period include Khutsalwati Secondary in Hazyview, Cebisa Secondary School in Ermelo, DD Mabuza Comprehensive High School in Tonga, Dibathuto Secondary in Limpopo, Kiriyaathswana Secondary in Secunda, Mehlwana Secondary in Ogies, Rev SA Nkosi in Mpuluzi, ZB Kunene in Nelspruit and Sofunda Secondary in Middelburg.

Feedback from the students was extremely positive. According to one student, the fulfilment he experienced was incomparable. "I realised we all have



→ Dr Hein Venter, coordinator of the successful community-based project, PumaScope, which entails computer skills knowledge transfer in the rural areas of Mpumalanga

a responsibility to help," he said. Another student remarked that he learnt that everyone has great potential and that all individuals must help and encourage others to learn and to develop their potential.

According to Dr Hein Venter of the Department of Computer Science, "Delivering this project to 10 schools out of the 28 000 schools in South Africa may sound like a drop in the ocean, but it definitely makes a difference. What strikes me most about the schools in which we deliver this project, is the sheer eagerness, willingness and appreciation to learn – one of the fundamental requirements for success."

Microsoft has been a sponsor of the project since 2003 and AtosOrigin joined as a sponsor from 2005. ☺

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# MAKING PROBLEMS WORK

by Linda Marshall

Every year, students from the University of Pretoria's Department of Computer Science get the opportunity to pit their skills and know-how against competitors in a formal battle of the brains.

This amazing opportunity comes in the form of the International Collegiate Programming Contest (ICPC), held by the Association for Computing Machinery (ACM). The contest requires team members to work together in order to solve relatively complex computer-science related problems.

## More about the ACM's ICPC

The ACM's ICPC dates back to 1970 when a contest was held by the Alpha Chapter of Upsilon Pi Epsilon in the USA. Over the next seven years, it evolved into a multi-tier contest similar to its present-day structure. In the late 1980s, it found its home at Baylor University, under the directorship of William B Poucher. Sponsors over the years have included Apple and Microsoft. IBM has sponsored the ICPC since 1997 and has pledged its continued support until 2012. Teams participate across the world in regional contests from September to November each year to facilitate the management of the contest. All regional contests are sponsored by IBM. The winners from the various regions compete at the world finals, which take place in March of the following year. The ICPC has grown from strength to strength over the last number of years, with 83 teams from across the globe participating in the 2006 world finals in San Antonio, Texas.

## ACM's ICPC in South Africa

The ACM's ICPC was introduced to South Africa in 1999 and was hosted by the Department of Computer Science at the University of Pretoria, with sites at Rhodes University and the University of Cape Town. In 2005, an additional site was established at the University of KwaZulu-Natal. On 14 October 2006, the eighth regional



ICPC held in South Africa managed to attract 49 teams from eight universities.

## Solving problems

In order to win the contest, a team, consisting of three members, needs to solve as many problems as possible within the contest's allotted five hours. In the event of a tie, the team that solves the problems in the shortest time wins. The problems are typically algorithmic in nature and usually rely heavily on computer science theory. The most difficult problems are predominantly Non-deterministic Polynomial (NP) time-complete, while easier problems tend to make use of well established mathematical formulae. The team needs to be able to code the solution that solves the problems within the set boundaries. The test data is designed to test the boundaries of the problem extensively.

## Hosting the contest

The first contests hosted in South Africa made use of a rudimentary judging mechanism. All sites (Pretoria, Grahamstown and Cape Town) were responsible for judging the teams at the site. The results were forwarded to a central location after the contest to determine the winning team. In 2003 and 2004, judging was done centrally at the University of Pretoria, using the same software as at the world finals.

In 2005, Jaco Kroon, who was working as a technical assistant at the University of Pretoria's Department of Computer Science, started writing Abacus, which takes the South African network situation, for example lower bandwidth, into account.

It makes use of centralised judging, but will revert to local judging of the

submitted solutions in the event of network failure. Abacus also requires less human interaction, as automatic markers are used and submissions are only forwarded to judges if the solution is not totally correct. Abacus has contributed to the success of both the 2005 and 2006 contests.

## Preparing teams for the contest

It is important to work together as a team. Each member contributes his or her own strengths. The most successful teams have one member who works out the algorithm required to solve the problem and puts key points on paper along with the basic algorithm. The second member should have an excellent ability to take the algorithm and code it into the programming language accepted by the contest, which best suits the problem. Finally, the third member develops test cases that test the boundaries of the problem to make sure the solution is fully tested before being submitted.

The contest is managed purely on a voluntary basis. Without the support from all the participating universities in South Africa and the volunteers who assist at these sites, there would be no contest. 📍

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