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COMPUTER SCIENCE
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FOR STUDENTS FROM AFRICA

Universiteit van Pretoria

The Department of Computer Science at Pretoria University is inviting applications for two annually awarded bursaries for MSc study. These bursaries are aimed at outstanding students who have a Computer Science Honours degree (or equivalent qualification). As far as possible, one such bursary will be awarded to a South African student, while the other will be awarded to a student from another African state. The hope is to thereby promote interaction between South African computer scientists and computer scientists elsewhere in Africa.

The bursaries are funded by the Department's contract research work and will amount to a minimum of R20000 per year. They are intended to cover costs for tuition, housing, transport, books, and an adequate allowance for other living expenses. Successful candidates will be required to work for 20 hours per week as part of the Computer Science Department's contract research team. The work assigned to each candidate will be aimed at providing him with practical experience in his field of interest.

Study fields for which bursaries will be considered include:
- Computer Networking
- Distributed Systems
- Software Engineering
- Artificial Intelligence
- Intelligent Computer Aided Instruction
- Machine Aided Translation

Students should aim to complete the dissertation that is required for an MSc within two years of study (i.e. one year of full time study). The dissertation should preferably be written in English but it may also be written in Afrikaans.

The continuation of the bursary and adjustments to the allowance will be decided upon annually and will depend on progress. It is a condition of the bursary that, after completing his/her studies, the student should return to his/her country of origin for the same number of years for which the bursary was held.

Applicants may request application forms from:

MSc. Bursaries
The Computer Science Department
University of Pretoria
Hillcrest
Pretoria
0083
South Africa

Editor's Notes

It is with sincere gratitude that SACJ takes leave of Dr Peter Lay who, until recently, was the assistant editor dealing with Information Systems. He has left academia for what sounds like a more gentle lifestyle. (He has gone farming!) Under Peter's stewardship the number of high-quality IS papers in SACJ grew steadily. In general, IS papers tend to be accessible and relevant to a wide spectrum of computer professionals, and the quality of IS papers that have been appearing in SACJ has significantly contributed to the increased interest being shown in the journal by the local computer industry. If this growth in interest is to be sustained, it is urgent and important to find a suitable replacement assistant editor. The ideal candidate should not only be respected as an academic by his peers, but should also be disposed to enthusiastically promote SACJ in the private sector. Since a shortlist of candidates is currently being compiled, I would like issue a general appeal for names that might be included on it. Please contact me urgently if you would like to be considered for the job, or if you would like to nominate someone that you consider to be particularly suitable.

My three year term of office as editor expires in October. I have always considered it a great privilege to hold this position, and as a result, I felt honoured when the SAICS executive committee requested that I stay on for a further term. Nevertheless, I initially declined the request on the grounds that the time-demands of the job were significantly eroding my ability to fulfil other duties. Particularly demanding has been the task of seeing to the typesetting of the various contributions - either by doing it myself, or by ensuring that it is adequately done by someone else. Recently, however, Prof G de V Smit (Riël Smit) at UCT has offered to assume the role of production editor. This generous offer so much changes the complexion of what is being asked of me that I am now both willing and honoured to continue as editor for another term. I am very grateful to Riël for his offer and I look forward to working with him. In future, authors whose papers have been accepted for publication will be asked to liaise directly with him regarding the precise form in which the final contribution should be submitted.

The next issue of SACJ will consist largely of a selection of papers that were presented at the 6th South African Computer symposium. The selection will be based on comments from the referees who, at the time, were asked to adjudicate the papers in terms of their appropriateness for both the conference as well as for SACJ publication. Papers which, in the opinion of one or more referees, required major revision will have to be resubmitted to SACJ for refereeing purposes. Authors will soon be contact in this regard.

At the time of writing, the updated list of "approved" publications for the first half of 1991 had not yet been released by the relevant authorities. For the sake of past, present and future contributors I sincerely hope that SACJ will be on the list when it eventually comes out. However, I have become increasingly aware that there is a real danger of laying too much store on papers published in so-called approved journals as a basis for evaluating and rewarding research. I hope to expand more fully on this theme in a future edition of SACJ. Keep watching this space!

Derrick Kourie
Editor

An Update on UNINET-ZA:
The Southern African Academic and Research Network
Vic Shaw
Manager: UNINET Project, Foundation for Research Development,

1. Background to the UNINET project

The UNINET Academic and Research Network is a collaborative project among Universities, Research Councils and the FRD for the development, implementation and promotion of an academic and research network of computers in southern Africa, where it is required as an essential element of the region's research infrastructure.

1.1 Project organisation
The project was effectively started late in 1987 as a result of joint action by the computer and network subcommittees of the Committee of University Principals and the Foundation for Research development (FRD). The management of the operation and further development of an academic and research network in South Africa was entrusted to the FRD by the participating organisations. The project staff at FRD consists of the Manager, Vic Shaw, and two assistants, Gwen Heathfield (part-time) and Annemarie Marais. The project enjoys collaborative support from staff at the participating organisations, notably from Rhodes University Computing Centre and Computer Science Department, Cape Town University Computer Centre, Natal University Department of Electrical and Electronic Engineering and Potchefstroom University Computing Services.

A UNINET Board, consisting of six members, three elected by participants and three directly appointed by the FRD, together with the Manager, acts as an advisory body in respect of the policy and operations of UNINET.

1.2 Participation in UNINET
Participation in UNINET is voluntary and is controlled by means of an agreement between each participating organisation and the FRD. There are currently twenty organisations participating, including sixteen universities and four research councils. Negotiations are in progress with other potential members, such as the more remote universities, including some in neighbouring states, and technikons.

1.3 Financing of UNINET
The FRD made an initial injection of funds for setting up the UNINET backbone. In principle, the FRD will continue to bear the cost of overall management, but the participants are expected to cover the direct operating costs through their participation fees.

1.4 Functions available on the network
The network provides desk-to-desk electronic mail and file transfer among the South African participants, as well as a limited facility for logon to remote machines. Many academics are currently using the network for desk-to-desk communication with colleagues locally and overseas, and for acquiring valuable research information on specific subjects, via "newsfeeds" and mailing lists. There is a large store of research software, available for the taking on overseas networks, which is being downloaded by local academics. Contacts are made and maintained not only with our traditional colleagues in Western Europe and the USA, but with Central and Eastern Europe since network restrictions to these countries have been lifted by the US Government, and with Taiwan, Japan and Australia.

1.5 Network protocols
The network initially used a variety of protocols that were in operation at various universities, such as IBM SNA and RSCS, DECNET, Kermit, but with the increasing availability of TCP/IP (Transmission Control Protocol/Internet Protocol) products and familiarity with their operation, there is now a general shift to TCP/IP. This protocol was developed in the USA and is currently the most widely used protocol for "interworking" within a network of heterogeneous equipment. A "master-plan" has been developed for the implementation of an overall TCP/IP network and this is being implemented (and where necessary modified), as and when sites become capable of implementing the protocol on their own equipment.

An experimental X.400 node has been established at Natal University and will soon be linked into UNINET's mailing system.

1.6 Overseas link
The network's overseas link currently consists of a 9600 bps (bits per second) dial-up link to a friendly networker on the West Coast of the USA., who provides a gateway between UNINET and the rest of the networking world. The costs of operating this dial-up have been steadily increasing and with a sudden upsurge in the use of the File Transfer Protocol (FTP), have overtaken the costs of a leased line. In the meantime negotiations are in progress for the installation of a permanent leased data line to the USA.

1.7 Network domain address
The Internet's addressing system is organised in hierarchical domains, the "top" domain being a "country"

domain. The top domain code for the Republic of South Africa is ZA, and the UNINET office has been delegated the responsibility for administering the ZA domain. There are currently three sub-domains of ZA, namely AC.ZA which presently covers the academic and research community, CO.ZA for the commercial sector and ALT.ZA for an informal group of individuals and organisations not in the other categories. Organisations participating in UNINET are registered as sub-domains of the AC.ZA domain.

2. Highlights in developing the network.

While the above gives the bare facts about the network, it is interesting to look back at some of the "highlights" in the development of UNINET-ZA, which, however trivial they may seem now, were important stepping stones in the evolution of the network. The first was a recommendation by a committee, appointed to report on the need and feasibility of a network, that the FRD should take responsibility for the implementation of the network. Then came the practical implementation of a RSCS dial-up mail-link between a Cyber and VAX at Rhodes and an IBM machine at Potchefstroom University, and thence into the embryo SNA network involving several organisations in the Pretoria and Witwatersrand area; this was the first practical demonstration of mail operating between dissimilar machines. This whetted the appetite of Natal University and the University of Cape Town, who were able to implement ad-hoc mail links between VAX and HP machines and Rhodes University using Kermit protocols, thus spreading the mail network to the major regional nodes.

In the meantime higher-speed DIGINET links had become available between the main centres and UNINET set up a backbone network of digital multiplexors which permitted us to configure a large number of point-to-point channels between various pairs of nodes on the network, using any protocol. This system was very useful in accommodating the multiple protocols that were then operating at universities and research organisations and enabled some of the participants to replace their own lines with channels on the UNINET backbone.

The next real breakthrough was attributable to Rhodes University in locating a friend (and a real friend he has proved to be), Randy Bush, who was willing, in the interests of universal networking, to provide a gateway from the Internet to UNINET; this was implemented by participating in FIDONET, a network operated by amateurs. The mechanism used was the establishment of a FIDONET gateway for the "Africa" zone at Rhodes University. This gave all persons on the UNINET network electronic mail links with the whole of the "internet" which included networks in the USA as well as BITNET, JANET, EARN - in fact to networks world-wide. The FIDONET protocol for transmission was later supplemented and largely replaced by the UNIX protocol, but gateways still provided access to and from FIDONET addresses.

In the meantime, we needed the credibility of having South Africa recognised as a "country domain" in the Internet Domain Naming System. This required the agreement of two sites in the USA, directly connected via TCP/IP to the Internet, to agree to act as "name-servers" for the ZA domain, and it took nearly a year of probing before two sites could be persuaded to take on this (technically trivial but politically quite onerous) task.

Finally, with the lifting of sanctions by the US, UNINET is now completely accepted by the National Science Foundation, who will permit our traffic to be passed over their high-speed trunks. There is considerable interest world-wide in promoting networks in Africa and UNINET is now well placed to take a leading role in the southern African region.

3. A glimpse into the future

As anyone with networking experience will know, there is only one direction for networking in the future, namely, higher speeds, more reliability and enhanced function, and this is the future that UNINET is aiming to achieve for the academic and research community in southern Africa.

Notes for Contributors

The prime purpose of the journal is to publish original research papers in the fields of Computer Science and Information Systems, as well as shorter technical research papers. However, non-refereed review and exploratory articles of interest to the journal's readers will be considered for publication under sections marked as a Communications or Viewpoints. While English is the preferred language of the journal papers in Afrikaans will also be accepted. Typed manuscripts for review should be submitted **in triplicate** to the editor.

Form of Manuscript

Manuscripts for review should be prepared according to the following guidelines.

- Use double-space typing on one side only of A4 paper, and provide wide margins.
- The first page should include:
  - title (as brief as possible);
  - author's initials and surname;
  - author's affiliation and address;
  - an abstract of less than 200 words;
  - an appropriate keyword list;
  - a list of relevant Computing Review Categories.
- Tables and figures should be on separate sheets of A4 paper, and should be numbered and titled. Figures should be submitted as original line drawings, and not photocopies.
- Mathematical and other symbols may be either handwritten or typed. Greek letters and unusual symbols should be identified in the margin, if they are not clear in the text.
- References should be listed at the end of the text **in alphabetic order** of the (first) author's surname, and should be cited in the text in square brackets. References should thus take the following form:

  [1] E Ashcroft and Z Manna, [1972], The translation of 'GOTO' programs to 'WHILE' programs, *Proceedings of IFIP Congress 71*, North-Holland, Amsterdam, 250-255.

  [2] C Bohm and G Jacopini, [1966], Flow diagrams, Turing machines and languages with only two formation rules, *Comm. ACM*, **9**, 366-371.

  [3] S Ginsburg, [1966], *Mathematical theory of context free languages*, McGraw Hill, New York.

Manuscripts *accepted* for publication should comply with the above guidelines, and may be provided in one of the following formats:

- in a **typed form** (i.e. suitable for scanning);
- as an **ASCII file** on diskette; or
- as a **WordPerfect**, T$_E$X or L$_A$T$_E$X or file; or
- in **camera-ready** format.

A page specification is available on request from the editor, for authors wishing to provide camera-ready copies. A styles file is available from the editor for Wordperfect, T$_E$X or L$_A$T$_E$X documents.

Charges

Charges per final page will be levied on papers accepted for publication. They will be scaled to reflect scanning, typesetting, reproduction and other costs. Currently, the minimum rate is R20-00 per final page for camera-ready contributions and the maximum is R100-00 per page for contributions in typed format.

These charges may be waived upon request of the author and at the discretion of the editor.

Proofs

Proofs of accepted papers will be sent to the author to ensure that typesetting is correct, and not for addition of new material or major amendments to the text. Corrected proofs should be returned to the production editor within three days.

Note that, in the case of camera-ready submissions, it is the author's responsibility to ensure that such submissions are error-free. However, the editor may recommend minor typesetting changes to be made before publication.

Letters and Communications

Letters to the editor are welcomed. They should be signed, and should be limited to about 500 words.

Announcements and communications of interest to the readership will be considered for publication in a separate section of the journal. Communications may also reflect minor research contributions. However, such communications will not be refereed and will not be deemed as fully-fledged publications for state subsidy purposes.

Book reviews

Contributions in this regard will be welcomed. Views and opinions expressed in such reviews should, however, be regarded as those of the reviewer alone.

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Contents