IFIP General Assembly in Botswana

September 2nd – 5th, 2005

Report of TC1 on Foundations of Computer Science

Takayasu Ito (TC1 Chair)

Introductory Remarks

In 2004 we organized the first TC1 Email meeting in June, and the TC1 meeting was held in Toulouse at the time of WCC 2004. At the TC1 meeting in Toulouse the first TCS Colloquium was held, having four speakers from TC1 Members.

- The most important in 2004 was to organize the TCS 2004 conference successfully. Profs. J.-J. Levy (FR), E. Mayr (DE) and J. Mitchell (US) organized TCS 2004 in a nice way, and they carried out it successfully.
- One important issue decided at the TC1 meeting in Toulouse has been to propose a new WG on Concurrency Theory to the TA. TC1 Chair has submitted a proposal to the TA, but the approval of the proposal at the TA has been postponed to check overlap with WG10.3 on Concurrent Systems in TC10.
- Another is about election of the next TC1 Chair, since the term of the current TC1 Chair finishes at the end of 2005 and he has no intention of re-elected. TC1 Chair has proposed to have Panel for the Election, formed by five TC1 members, and the proposal was accepted at the TC1 meeting.

Issues incurred by financial failures of WCC 2002 in Montreal had created lots of unhappy and unpleasant mails among TC1 members. According to a mail from the IFIP President the bankruptcy court hearing of WCC 2002 financial issues has finished early 2002, and then I believe the issues related to WCC 2002 financial failures has been treated and settled by the IFIP office.

In February, 2005 we had the second TC1 Email meeting, and we formed Panel for the Election of the next TC1 Chair, following the decision made at the TC1 meeting in Toulouse. Also,

TC1 Chair proposed procedures for the election, including a schedule of the election. These proposals were accepted at the Email meeting and the Panel. Following these procedures the nomination and election of the next TC1 Chair were held in March - May, 2005, and Prof. M. Hinchey (US-IEEE) has been elected as the TC1 Chair for the term of 2006--2008. After the election he has been appointed as the Vice Chair of TC1 on July 1st (until the end of 2005), based upon the procedures for the Chair election. On June 30th we had the TC1 meeting in Chicago; important issues of the meeting are reported below.

1. TC1 Meetings in 2005

TC1 Email Meeting: February 1st – 10th, 2005
TC1 Meeting in Chicago: June 30th, 2005
TC1 Email Meeting: (October, 2005)

2. Membership Issues

There have been two issues on TC1 membership:

* Election of the next TC1 Chair for the term 2006—2008
* Appointment of the TC1 Vice Chair.

(2.1) Election of the next TC1 Chair for the term 2006—2008

* As was reported in the Chairman's Report for the IFIP Council in Korea, the current TC1 Chair finishes his term at the end of 2005, so that he asked TC1 members to form "Panel for Election of the Next TC1 Chair", mentioning that he has no intention of "re-elected". At the TC1 Email meeting held early February the TC1 Chair proposed some basic procedures for the election, together with a proposal of Panel formed by the following members:

  W. Brauer (DE; Panel Chair), D.S. Johnson (US-ACM), I. Simon (BR),
  G. Ausiello (IT; Past TC1 Chair), T. Ito (JP; Current TC1 Chair)

  This proposal of Panel and the basic procedures for the election was approved.
* The Panel Chair sent Call for Nomination to all TC1 members (including WG Chairs). Also, the Panel discussed about some possible candidates for the next TC1 Chair, and the Panel Chair and members had contact with possible candidates mentioned during the discussions in the Panel.

  Mike Hinchey (US-IEEE) was proposed, and after some discussions the Panel decided to held the election with a single candidate, Mike Hinchey.
* Election and its result

The election was held under the leadership of the Panel Chair, and its voting was conducted by the Head of the IFIP Secretariat. The election result is as follows:

- Persons with voting rights: 51
- Received votes: 32 (62.7 %)
- Valid votes: 31 (60.8 %)
- Not valid: 1

Out of valid votes:

- for Mike Hinchey: 31 (100 %)
- against: 0
- abstain: 0

The above result was also confirmed at the TC1 meeting in Chicago. We are pleased to have Mike Hinchey as the next TC1 Chair for the term 2006--2008.

(2.2) **Appointment of the TC1 Vice Chair**

After the election of the next TC1 Chair, the current TC1 Chair has proposed appointing Mike Hinchey as TC1 Vice Chair. This proposal was approved within the TC1, and it was confirmed at the TC1 meeting in Chicago.

Mike Hinchey has been appointed as the TC1 Vice Chair on July 1st, and he will serve as TC1 Vice Chair until the end of 2005.

3. TC1 Funds for 2006

Our TC1 budget plan is as follows:

a. Royalities 250 euro
b. Event proceeds 0 euro
c. Other incomes 0 euro
d. Operating expenses 3,000 euro
e. Activity expenses 3,800 euro
(for IFIP School by WG1.6: 1,500 euro)
(for Workshop by WB1.3: 1,000 euro)
(for LATIN 2006: 1,300 euro)
f. Result (a+b+c+d-e) -550 euro
g. Fund balance (2,999 euro * 0.8 -550) 1,849 euro
(2,999 euro is the fund balance for 2005)
h. Fund to be used in 2006 3.800 euro

The final TC1 budget for 2006 will be decided at the GA in Botswana in September, 2005.

4. Issues on Working Groups

(4.1) No specific technical report from WG Chairs.

{See their homepages for their activities.}

(4.2) On Proposal of Creating of WG1.8 on Concurrency Theory

Creation of WG1.8 on Concurrency Theory was decided at the last TC1 meeting in Toulouse.

To follow up the decision the TC1 Chair wrote a proposal for creation of WG1.8, which was formally submitted to the TA held at Toulouse. The proposal was well accepted at the TA. But the TC10 Chair mentioned that he needs to consult within TC10 to see and check overlap between their WG10.3 on Concurrent Systems and TC1's proposal of WG1.8 on Concurrency Theory. So, the final TA decision of creating WG1.8 on Concurrency Theory has been postponed.

Since last September some additional issues had been created from the proposed WG1.8 Chair and his colleagues, with lack of their understandings.

However, after the TC1 meeting in Chicago, the issues on the WG1.8 proposal have been settled. The proposal of creating WG1.8 on Concurrency Theory has been re-submitted to get approval of the TA in Botswana.

The proposal itself has been strengthened, adding "Some Challenging Topics in Concurrency Theory" (which was prepared by the TC1 Chair as attached in the Appendix), "Initial Plan of Activities", Policy for WG Membership and a file of Short CVs of the proposed WG members.

TC1 expects that the proposal of creating WG1.8 on Concurrency Theory would be approved at the TA in Botswana.

(4.3) Re-establishing WG1.5.

* WG1.5 on Cellular Automata and Machines was dis-solved in March, 2004 because of internal fight among the WG1.5 members.

* What happened in WG1.5?

In Autumn, 2003 two groups within WG1.5 elected different WG1.5 Chairs, and both of them asked the TC1 Chair to appoint their elected WG1.5 Chairs as the WG1.5 Chair. The TC1 Chair asked them to organize WG1.5 in a friendly manner. However, they had some severe internal affairs, so that it was found difficult for them to unify WG1.5.

* Taking into account the importance of Cellular Automata and Machines and the above circumstances, the TC1 Chair has proposed to re-establish WG1.5 at the TC1 meeting in Chicago, having the following structure:

Chair: R. Vollmar (DE), who served as WG1.5 Chair when TC1 started in 1997.
Vice Chair: (KKKKK), (MMMMM) {Both are persons elected in two groups.}
WG1.5 Members: (Members who appear in IFIP Bulletin 2004.)
SIG on Foundations of Cellular Automata, chaired by (WWWWW)
SIG on Discrete Systems Modeling and Cellular Automata, chaired by (DDDDD)
[Remarks] After re-establishing WG1.5, its Chair (R. Vollmar) should conduct the WG to form a friendly one, and he should conduct an election of a new WG1.5 Chair within two years.

* After the TC1 meeting in Chicago the TC1 Chair has contacted Prof R. Vollmar about re-establising WG1.5 along with the line mentioned above, and he has replied to make his efforts for re-establishing WG1.5; actually, he has started to contact key persons. However, it would take time for Prof R. Vollmar to reach consensus for re-establishing the WG.

5. On Collaboration to WCC2006 in Chile

- The next WCC (IFIP World Computer Congress) will be held in Santiago, Chile in August, 2006. All TCs have been asked collaboration to WCC2006.
  At the TC1 meeting in Toulouse we discussed if we organize TCS2006 within WCC2006. However, there was no support for organizing TCS2006 within WCC2006.
- The TC1 Chair thinks that it would be important for TC1 to provide collaboration to WCC2006, so that he has asked TC1 Members to propose some workshops to form a theory track within WCC2006. By the time of the TC1 meeting in Chicago there was no proposal.
- After the TC1 meeting in Chicago the TC1 Chair has asked two TC1 members (R. Baeza-Yates and I. Simon) from LATIN and WG Chairs to propose workshops for WCC 2006 in Chile. One of WG chairs has expressed his interest in organizing a workshop. It is important to have at least a proposal from LATIN to implement a theory track within WCC 2006, so that we are waiting for more proposals.
  Getting help of M. Hinchey (the newly appointed Vice Chair), we would seek possibility of organizing a theory track within WCC 2006.

[APPENDIX] “Some Challenging Topics in Concurrency Theory”

Takayasu Ito

There have been a number of challenging topics in concurrency theory since the notion of concurrency was created in theoretical studies of concurrent processes in operating systems and parallel computations.

Current flourishing theoretical studies on concurrency are based on two distinct approaches:

* One is based on message-passing models that stem from Hoare's CSP and Milner's CCS and pi-calculus.
* Another is based on logical approaches that are notably represented by temporal logic descriptions initiated by Burstall and Pnueli and linear logic descriptions invented by Girard.

Both approaches have been developed in the framework of Plotkin's style of describing operational semantics called SOS (Structured Operational Semantics) inspired by the Gentzen's Sequent Calculus.

Besides these approaches there are a number of studies on concurrency like Petri nets, automata-theoretic approaches, language-theoretic approaches (like shuffle and/or concurrency expressions).

Also, from the standpoint of parallel algorithms and complexity theory a number of models have been proposed.

Current theoretical studies on concurrency have been based on the use of message-passing models and logical approaches, and they have had considerable influences of the latest technological progresses like "internet and web computing", "security issues", "cluster computing and massively parallel computing", "bio-computing and molecular computing".

Below we describe a number of challenging topics in concurrency theory.

[1] Establishing theoretical foundations of provably correct and reliable operating systems
{This has been a great and challenging theme in concurrency theory since 1960s, but almost no one has ever achieved this aim in a satisfactory way because of its difficulty.}

[2] Establishing logical frameworks of concurrency with mechanisms for recovery from deadlock and starvation, and for detecting malfunction in concurrent systems

[3] Bridging concurrency theory and parallel computation so as to establish a sound and efficient parallel computing framework from both of semantical and algorithmic standpoints

These three have been challenging yet fundamental issues in concurrency theory
since early 1970s.

Reflecting the latest developments in computers and networks there have been a number of challenging themes, some of which are subsidiary topics of the above three major themes.

[a] Process calculi that guarantees "safety and security" and "trustiness" of processes and their actions

[b] Process calculi with ability of expressing mobility, temporality , resource sensitiveness, cost-sensitiveness , and locality.

[c] Process calculi with trustiness of information as theoretical bases of mobile processes in global networks.

[d] Theoretical foundations of verifying compilers for concurrent and distributed languages.

[e] Theoretical foundations of efficient concurrent and parallel computing for irregular and mixed data/information structures.

[f] Theories of powerful parallel control mechanisms and structures and their applications in hardware design and parallel language design

[g] Design and implementation of theory-based languages and systems and theory-based tools for design and implementation.

[h] Emerging applications in

1. Industrial applications
2. Socio-Economic applications
3. Biological applications