NordicTransputer User Group
3rd Conference Copenhagen 14.- 15. May 1993

Workshop on Parallel Programming Languages

18 questions concerning

Assembled by Øyvind Teig
Autronica A/S

"The connection between the language in which we think / program and the problems and solutions we can imagine is very close. For this reason, restricting language features with the intent of eliminating programmer errors is at best dangerous."...

Bjarne Stroustrup
The C++ Programming Language
2 ed., 1991 (page 8)

1. Is he generally right?
2. What could be dangerous with occam?
3. Is clean semantics contrary to the thinking process?

...*"As with natural languages, there are great benefits from being at least bilingual. The language provides a programmer with a set of conceptual tools; if these are inadequate for a task, they will simply be ignored. For example, seriously restricting the concept of a pointer simply forces the programmer to use a vector plus integer arithmetic to implement structures, pointers etc."...*

Bjarne Stroustrup
The C++ Programming Language
2 ed., 1991 (page 8)

4. Is there any "inadequate conceptual tool" in occam?
5. Do occam and C as a mixed language platform make sense?
6. Is he right about pointers and occam?

...*"Good design and the absence of errors cannot be guaranteed merely be the presence or absence of specific language features."*

Bjarne Stroustrup
The C++ Programming Language
2 ed., 1991 (page 8)

7. Won't PAR increase the quality of the design?
8. Won't alias checks and side-effect free FUNCTIONs decrease the amount of errors?

CSP and occam profile

Hoare¥s 1978 language fragment came to be known as CSP. Occam was developed from it and mainly consists of:

- Process creation
- Coordination
- Guards

Occam relies on *named channels* rather than named processes for communication. This is important in order to be able to make libraries.

Source:
D.Gelernter / S.Jagannanthan
Programming Linguistics
1990 (page 359)

Dynamic channel assignment

*"Note that it remains impossible in occam, as it was in CSP, to write a utility routine that is capable of receiving a request from **any** process that chooses to make contact; the occam routine we've discussed must designate some particular channel, and for the life of any program that channel's other end will be tied to **one** particular process."*

D.Gelernter / S.Jagannanthan
Programming Linguistics
1990 (page 366)

9. Will this be the case in occam-3? Is there any occam-2 solution?

occam and Linda

"Both languages are designed to the same aesthetic standard: they both are as simple as their designers could make them."

D.Gelernter / S.Jagannanthan
Programming Linguistics
1990 (page 374)

10. Has the simplicity of occam limited its usefulness?
11. Is occam simple to learn / use?

occam and Linda in use

".. both languages have been implemented efficiently. ... An enormous number of parallel programming languages have been proposed - but not all have been implemented. Of those that have, even fewer have seen any significant use outside the research group directly responsible for their creation."

D.Gelernter / S.Jagannanthan
Programming Linguistics
1990 (page 374)

12. How many are actually using occam?
13. Is the number increasing or decreasing?

occam - static

"CSP and occam don't allow processes to be created while a program executes; all process must be accounted for at compile-time. ..it can't implement a pipeline that lengthens, in the sense of adding new processes, as the program runs"

D.Gelernter / S.Jagannanthan
Programming Linguistics
1990 (page 375)

14. Is this entirely true for occam?
15. Would the considerable run-time overhead imposed be acceptable?

occam - channels on links

"Because occam's channels correspond directly to the physical links in a transputer array it can't have more than four links to the rest of the network."

D.Gelernter / S.Jagannanthan
Programming Linguistics
1990 (page 377)

16. Does the virtual channels remove this restriction?
17. Does the virtual channels remove the need for occam multiplexors?

.."So why would anybody program in occam?"

.."Because (1) the resulting program will be highly efficient, and (2) since the application is tailor-made for occam, it will be easy to express in occam - why look further?"

D.Gelernter / S.Jagannanthan
Programming Linguistics
1990 (page 384)

What comes after infancy?

"The occam2 language is still in its infancy and will no doubt mature over the coming years."

Burns / Wellings
Real-Time Systems and their Programming Languages
1990 (page viii)

18. What is needed of occam and its developers and users to make it survive yet another 10 years?

Foilsocc.doc