本田耕平先生を偲んで

In memory of Prof. Kohei Honda

On the occasion of JSSST 2013

September 12, 2013

Some images by courtesy of Prof. Vasco Vasconcelos,
University of Lisbon

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Computer Science
Bibliography

SCHLOSS DA
Leibniz-Zentrum für

Kohei Honda ✂ 🅿

List of publications from the DBLP Bibliography Server - F
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		2012
j23		Marco Carbone, Kohei Honda, Nobuko Yoshida: Structured Communication-Centered Programming for Web Services. ACM Trans. Program. Lang. Syst. 34(2): 8 (2012)
c50		Tzu-Chun Chen, Kohei Honda: Specifying Stateful Asynchronous Properties for Distributed Programs. CONCUR 2012: 209-224
c49		Romain Demangeon, Kohei Honda: Nested Protocols in Session Types. CONCUR 2012: 272-286
c48		Luca Fossati, Kohei Honda, Nobuko Yoshida: Intensional and Extensional Characterisation of Global Progress in the π-Calculus. CONCUR 2012: 287-301
c47		Kohei Honda: Session Types and Distributed Computing. ICALP (2) 2012: 23

In Memoriam

Kohei Honda

1959 – 2012

St Benet's Chapel
Queen Mary, University of London
Tuesday 11th December 2012 at 3pm

Short Bio

- 　　　法学士，東京大学
- 　　　マッキャンエリクソン博報堂
- 1992　MSc from Keio University, JSPS research fellow
- 1994　PhD from Keio University
- 1995　University of Manchester
- 1996　University of Edinburgh
- 1999　Queen Mary and Westfield College, University of London

Some of Kohei's work

- Asynchronous π-calculus
- Reduction-based semantics
- Types for processes
  - Session Types
  - WS-CDL
  - Scribble
- Computation as Interaction
  - Game Semantics
  - Proof Nets
- Program Logics

背景 ― 1980年代の計算モデル研究 (~日本ソフトウェア科学会の草創期)

- 多様な並行計算モデルと言語の開花
  - Actors
  - 並行オブジェクト (Concurrent Smalltalk, ABCL, …)
  - 並行論理型・並行制約
  - プロセス代数 (CCS, CSP, …)
- オブジェクト指向の outbreak
- 第五世代コンピュータプロジェクト (1982-1993)
  - 「並列知識情報処理」のモデルと実証実験
- 多数の外国人研究者の来日
  - Carl Hewitt @ Keio (1989-1990) etc.

背景 ― 1980年代の計算モデル研究

Object-Oriented Concurrent Programming
edited by Akinori Yonezawa and Mario Tokoro


Akinori Yonezawa

Mario Tokoro

This book deals with a major theme of the Japanese Fifth Generation Project, which emphasizes logic programming, parallelism, and distributed systems. It presents a collection of tutorials and research papers on a new programming and design methodology in which the system to be constructed is modeled as a collection of abstract entities called "objects" and concurrent messages passing among objects. This methodology is particularly powerful in exploiting as well as harnessing the parallelism that is naturally found in problem domains.

非同期π計算 (1991) の時代背景

- 並行処理における同期通信 vs. 非同期通信論争
  - 同期：　大多数の理論モデル
  - 非同期：大多数の並行言語と実装
  - 同期が先か，非同期が先か？（鶏-卵論争）
- 動的に進化する計算システムの概念の浸透
  - メンバと接続関係の動的な変更
  - 実践（言語と実装）が先行
    （並行オブジェクト，並行論理型言語等）
  - 理論は1980年代終りに出現

π計算 (Milner, Parrow, Walker, 1989)
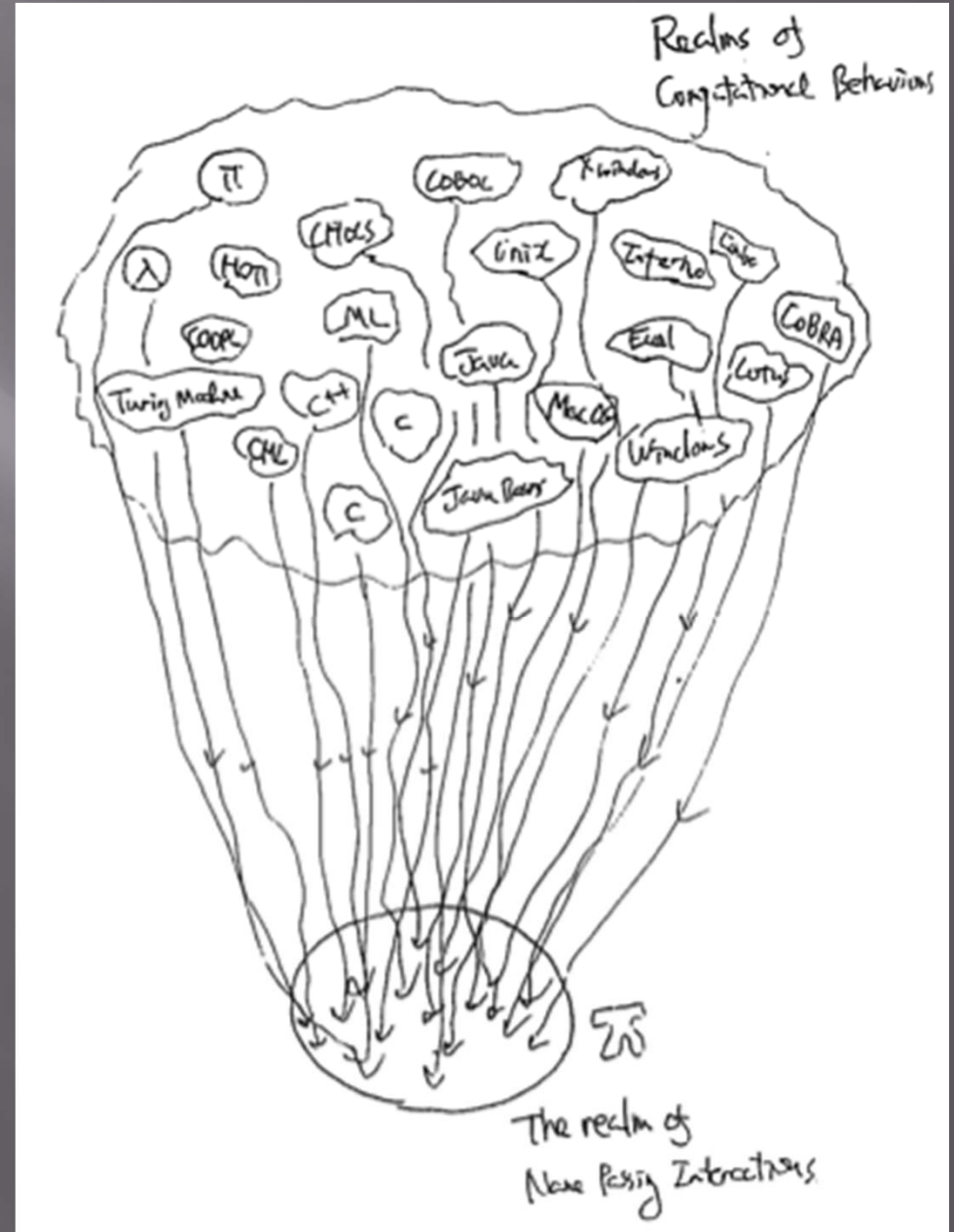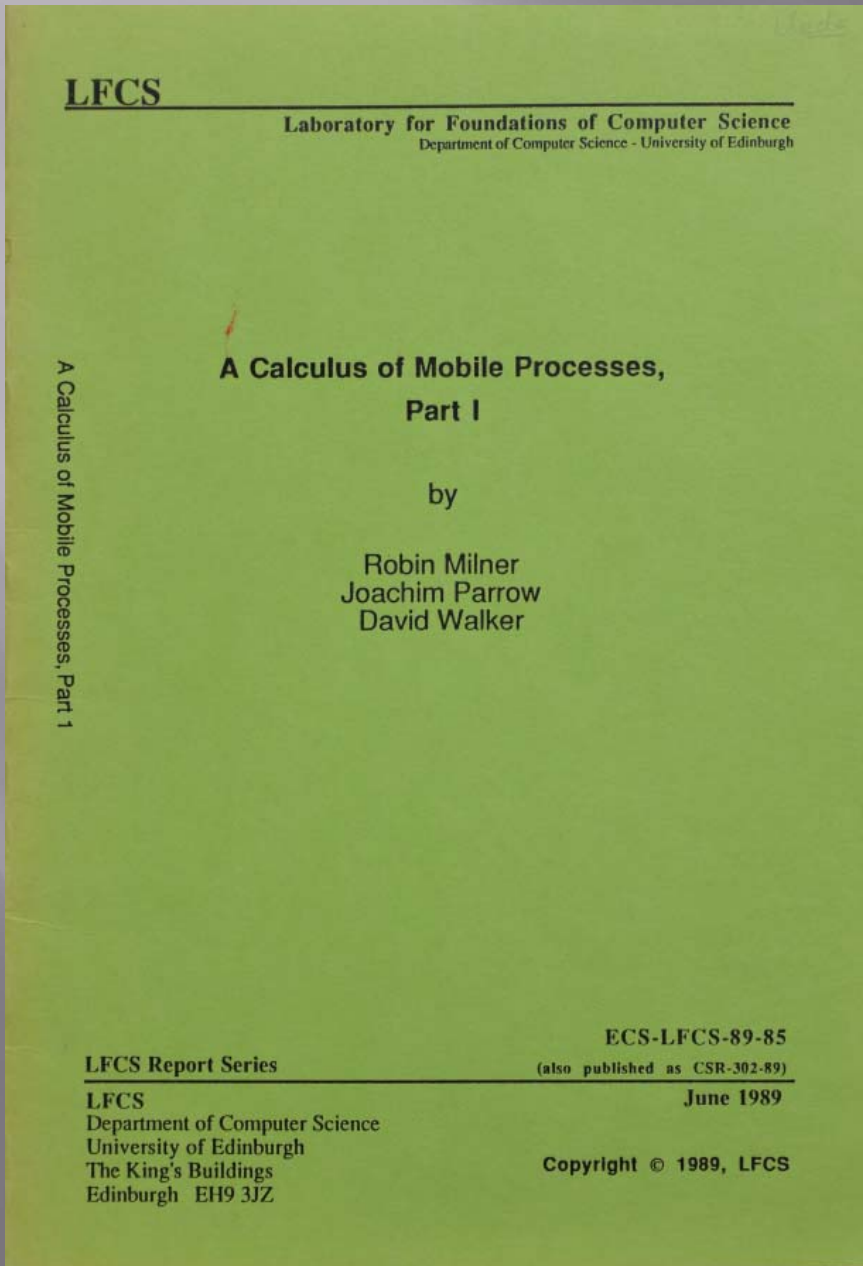
An Object Calculus for Asynchronous Communication
(Honda and Tokoro, ECOOP'91, Geneva)

- π計算は（プロセス代数の伝統に基づき）同期通信を採用していた

- 比肩できる非同期計算モデルはなかった

- π計算への非常に単純な制限によって，表現力と説得力が高くかつ良い理論的性質を持つ非同期計算モデル (calculus) を提案した

  - ν計算と命名，非同期π計算として普及

- その後，世界の並行計算の理論研究の大多数がこの非同期版に基づいて展開される

簡約意味論（本田・吉田，1994）

- 『並行計算のための簡約意味論』 コンピュータソフトウェア, Vol. 11, No. 5, pp. 2-20, 1994.
  - 日本ソフトウェア科学会第１回論文賞
  - 本田さん主著の数少ない日本語論文

- 意味論－計算機科学の最も根源的な（＝あらゆる情報技術が拠って立つ）部分を扱う分野
  - コンピュータプログラムの本質は何なのか?
  - 「二つのプログラムが同じ」とはどういうことか?

簡約意味論（本田・吉田，1994）

- 「（並行）計算の根源は何か」は現在でも合意がとれていないテーマ（cf. λ 計算）
  - オブジェクトとメッセージ？
  - 名前のやりとり (name passing)？
  - 制約のやりとり (ask/tell)？
  - etc.

- π 計算はこれを追究する良き土台を提供した
  - ところが多数の異なる意味論 (???) を生み出した

簡約意味論（本田・吉田，1994）

- λ 計算の深い技法 (Barendregt) を援用しつつ「意味論のあり方」一般に踏み込む

  - "... このことは，一方では観測可能性の長所，すなわち多種多様な目的に即した意味論を定義できることを示しているのだが，同時に観測可能性に基づかない規範的な意味理論を構築することが重要であるということを示唆している" (p. 6)

  - " ... こうして簡約関係のみに基づく真に規範的な等価性として $\Im_\nu^*$ を得ることができた" (p. 11)

$$\lambda \quad M ::= x \mid \lambda x.M \mid MN.$$

$$\pi \quad P ::= \Sigma \pi.P \mid P|Q \mid (\nu x)P \mid !P \mid 0.$$

$$\text{with} \quad \pi ::= x(y) \mid \overline{x}\langle y\rangle.$$

Session Types

- First presented at CONCUR 1993, Germany

Types for Dyadic Interaction*

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Abstract

We formulate a typed formalism for concurrency where types denote freely composable structure of dyadic inter-action in the symmetric scheme. The resulting calculus is a typed reconstruction of name passing process calculi. Systems with both the explicit and implicit typing disciplines, where types form a simple hierarchy of types, are presented, which are proved to be in accordance with each other. A typed variant of bisimilarity is formulated and it is shown that typed β-equality has a clean embedding in the bisimilarity. Name reference structure induced by the simple hierarchy of types is studied, which fully characterises the typable terms in the set of untyped terms. It turns out that the name reference structure results in the deadlock-free property for a subset of terms with a certain regular structure, showing behavioural significance of the simple type discipline.

Session Types

- "$\mathcal{L}$ is based on three pairs of communication primitives which use the notion of a *session*, a semantically atomic chain of communication actions which can interleave with other such chains freely, for high-level abstraction of interaction-based computing."

  —Takeuchi, Honda, Kubo, PARLE'94

- その後 Web Services Choreography Description Language (WS-CDL, by W3C) などに展開
    - Web サービスの挙動に関する型体系を提供

吉田展子さんとのQ&A

(KU) 本田さんがコンピュータサイエンスの道に入ることになったきっかけや動機は？

(NY) He wished to understand books in a bookshelf which contains Computer Science books in Iwanami Shoten (Kinokuniya?) in Shinjuku.
But a real motivation he entered computing was he met Carl Hewitt, and he enjoyed interactions with other researchers he met during Keio. (circa 1990)

吉田展子さんとのQ&A

(KU) 本田さんが追いかけていた研究上の夢は？
　（私なりにわかっているつもりではありますが...）

(NY) I cannot write in a word — it is a lot.
　If you can tell other people what you think of his dream, that is indeed his dream.
　I am sure Kohei-san wishes to hear from you.
　But I can say he always tries to understand what are computations.

Kohei! Why did you leave us in such a hurry?

On a day when success seemed so near,

Hit whilst at your research, you still tried to talk,

Every word muddled, soon your world stood still.

I and your mother were so proud of your studies and work.

Honest and bright you grew up in the heart of our family,

On the dining table, you chattered and worked all the time,

No childish diversions could disturb you; all tried in vain,

Did this upbringing teach you to become so concentrated?

And why was our strong, self-reliant boy struck with such
pain?

(cont'd on next slide)

Knowledge and understanding built your fine character,
Out of this background a brilliant intellectual emerged; a
High achiever from Tokyo University Law School you went to
East London where blossomed a marriage of scientific minds.
I thank God for the wonderful son we were sent.

Kohei! Why did you leave us in such a hurry?

By Mr. Ryohei Honda
Father of Kohei Honda

http://smu.gs/V5nYKR