

Programming Languages

Olivier Danvy

Computer Science Day

15 June 2011

Plan

2010–2011:

1. State of the union.
2. A research sample.

A year of postcards



A year of funding

- Sapere Aude (Anders): 7.9 M. DKK
- FTP (Anders): 4.8 M. DKK
- Google Research Award (Anders): \$65,000
- IBM Faculty Award (Anders): \$20,000
- Networking (Olivier & Jan): 0.4 M. DKK

A year of publications

- Peer-reviewed meetings: OOPSLA, ECOOP, SAS, FOSSACS, FTFJP, ICSE, PPDP, etc.
- Information and Computation, Theoretical Computer Science, Science of Computer Programming, etc.

See the board in our corridor!

A year of international visitors

Faculty:

- Jens Palsberg (UCLA)

PhD students:

- Ilya Sergey (KU Leuven)
- Alvaro Garcia Perez (Madrid)

A year of visits abroad

- IBM, New York; Google, New York; Wisconsin (Anders)
- University of Freiburg (Anders and Olivier)
- Microsoft, Redmond (Anders and Esben)
- Oxford University (Anders and Asger)
- Paris, Cornell and Oregon (Olivier)
- Japan (Olivier and Ian)

A year of internships

- IBM New York (Simon)
- Google, New York (Jakob)



A year in program committees

- DSL, Scheme & FP (Jan)
- PLDI, ICDE, POPL, PASTE, PPPJ, FoVeOOS, APLWACA (Anders)
- AOSD, GTTSE, OOPSLA, PLDI, FOAL, SAC, TOOLS, ECOOP, TAOSD (Erik)

A year of chairing and editorship

- DANSAS 2010 (Jan)
- ICFP 2011, DSL 2011 (Olivier)
- HOSC, JFP, Talcott Festschrift (Olivier)



A year of scientific service

- Doctoral Symposium at ECOOP (Erik)
- EAPLS best PhD thesis award (Olivier)
- External evaluation of PhD dissertations.

A year of awards

- Google PhD Fellowship (Ian)
- Specialeprisen 2010 finalist (Lene)
- Most influential paper PPDP'01 paper
(Olivier and Lasse)



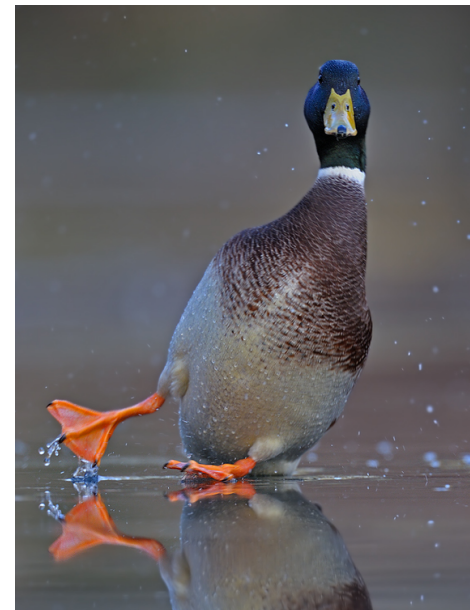
A year of exciting undergrad courses

- dRegAut, dWebTek, dConc, (Anders)
- dOpSys, KBP2 (Erik)
- dProgSprog (Olivier)
- dOvs (Jan)



A year of enlightening graduate courses

- Client-Based Web Programming,
Server-Based Web Programming
(Michael, Anders, Mathias)
- Software Verification (Anders)
- TOOL (Erik)
- dIFP, dTFP (Olivier)
- Abstract Interpretation (Jan)

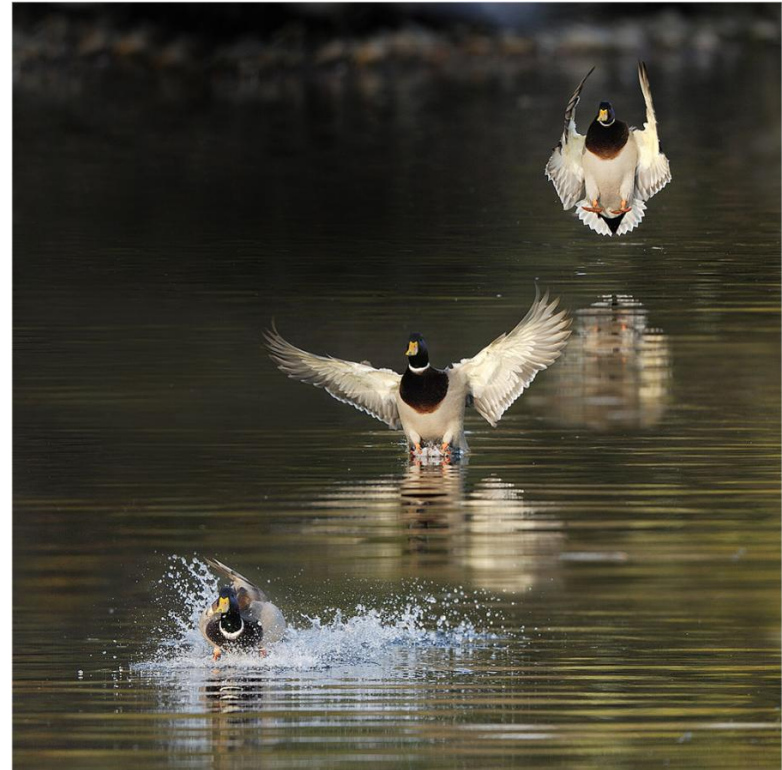


A year of external education

- Oregon Summer School (Ian and Jan)
- Summer School in Software Engineering and Verification (Mathias and Magnus)
- Functional Programming in Utrecht (Jeppe)
- Generative & Transformational Techniques in Software Engineering (Olivier)

A year of graduations

- Anders Bach Nielsen
- Jesper Ilsøe Nielsen
- Lene Mejlby
- etc.



A year of PhD-student intake

- Esben Andreasen
- Asger Feldthaus
- Magnus Madsen



A year of synergy

- the PL seminar
- the Entropy meetings
- attending each other's lectures
- synchronized teaching
- Friday DatCafé

Plan

2010–2011: a **fruitful year**.

1. State of the union. ✓

2. A research sample.

Plan

2010–2011: a fruitful year

1. State of the union. ✓

2. A research sample: call by need.

Reminder about parameterization

- Computational abstractions (procedures, functions, etc.) are **parameterized**.
- Invoking an abstraction binds the **formal parameters** to the **actual parameters**.

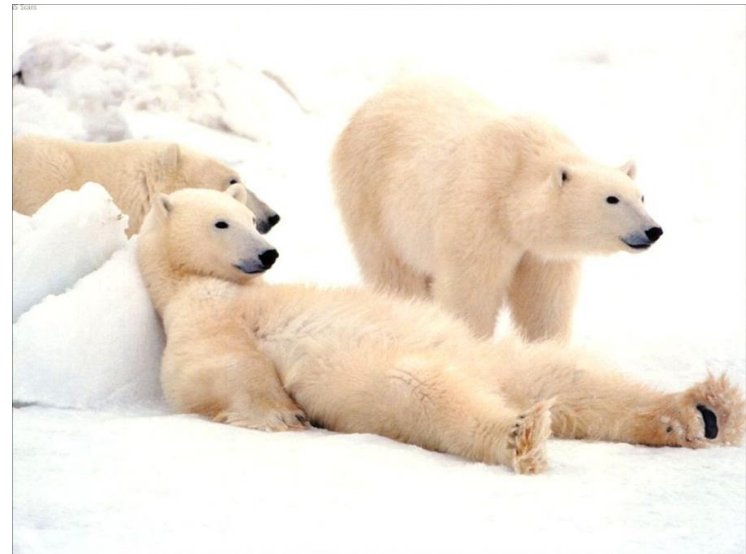
Common parameter-passing strategies

- call by value
- call by name
- call by need
- etc.

Call by need

In lazy functional programming, for example, computation is

- **demand driven**, and
- intermediate results are **memoized**.



Theory and practice of call by need

- In theory, we know **why** it works.
- In practice, we know **how** to make it works.

But do theory and practice agree?

Surprisingly, nobody quite knows.

What is known?

- Theory: syntactic accounts
(λ -calculus, Combinatory Logic).
- Practice: store-based implementations
(graph reduction).

Our contribution (Danvy & Zerny)

To inter-derive semantic artifacts:

- either using off-the-shelf transformations,
- or designing new ones
and proving them correct
by lock-step equivalence (bisimilarity).

Unified results

- Combinatory Logic ✓
- λ -calculus ✓

...a celebration of computational unity.

Thank you

