Preserving Life

an hommage to Hassan's legacy

Roberto Di Cosmo

Director, Software Heritage
Inria and Université de Paris Cité

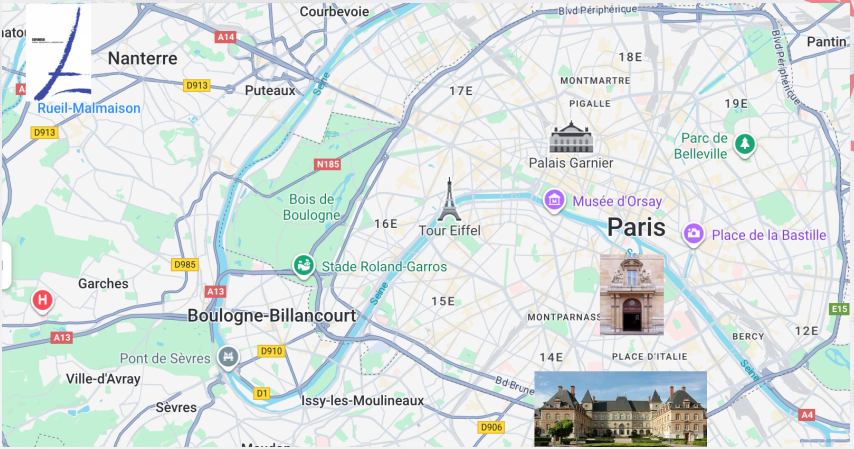
September 26th 2025

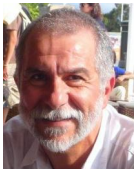
Software Heritage

THE GREAT LIBRARY OF SOURCE CODE

Outline

1992: an Italian in Paris





An Introduction to LIFE—Programming with Logic, Inheritance, Functions, and Equations

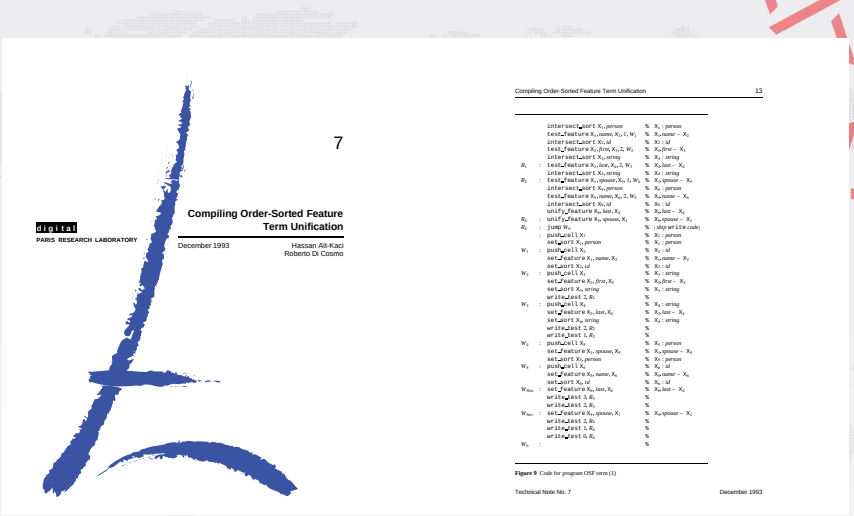
Hassan Aït-Kaci
Digital Equipment Corporation
Paris Research Laboratory
85, avenue Victor Hugo
92500 Rueil-Malmaison, France
hak@prl.dec.com

Abstract

LIFE (Logic, Inheritance, Functions, Equations) is a programming language with a powerful facility for structured type inheritance. LIFE reconciles styles from functional programming and logic programming by implicitly delegating control to an automatic suspension mechanism. This allows interleaving interpretation of relational and functional expressions that specify abstract structural dependencies on objects. Together, these features provide a convenient and versatile power of abstraction for very high-level expression of constrained data structures.

... l'élément ne préexiste pas à l'ensemble, il n'est ni plus immédiat ni plus ancien, ce ne sont pas les éléments qui déterminent l'ensemble, mais l'ensemble qui détermine les éléments.
Georges Perec *La vie, mode d'emploi*.[1]

3 months of Life at DEC PRL



7

digital
PARIS RESEARCH LABORATORY

Compiling Order-Sorted Feature Term Unification

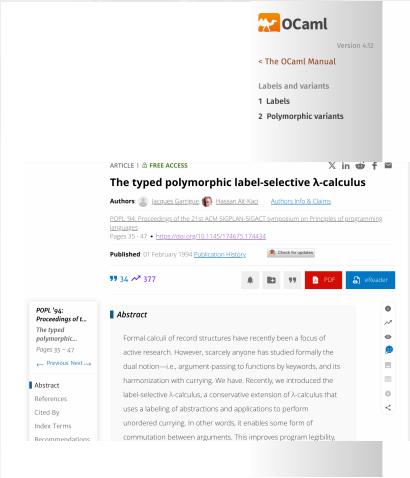
December 1993

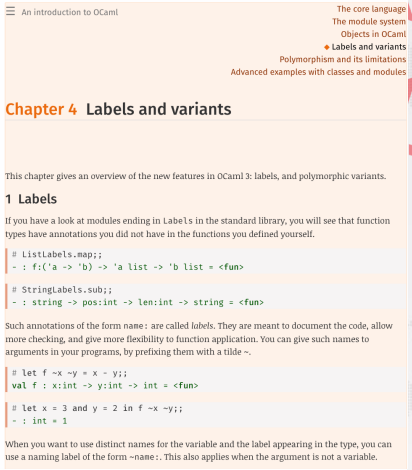
Hassan Aït-Kaci
Roberto Di Cosmo


```
        intersect_sort X1, person          % X1 : person
        test_feature X1, name, X2, 1, W1   % X2 name ← X2
        intersect_sort X2, id              % X2 : id
        test_feature X1, first, X3, 2, W2  % X3 first ← X3
        intersect_sort X3, string          % X3 : string
R1  :   test_feature X1, last, X4, 2, W3   % X4 last ← X4
        intersect_sort X4, string          % X4 : string
R2  :   test_feature X1, spouse, X5, 1, W4 % X5 spouse ← X5
        intersect_sort X5, person          % X5 : person
        test_feature X5, name, X6, 2, W5   % X6 name ← X6
        intersect_sort X6, id              % X6 : id
        unify_feature X4, last, X7         % X4 last ← X7
R3  :   unify_feature X6, spouse, X1       % X6 spouse ← X1
R4  :   jump W6                            % (skip write code)
W1  :   push_cell X1                       % X1 : person
        set_sort X1, person                % X1 : person
W2  :   push_cell X2                       % X2 : id
        set_feature X2, name, X2           % X2 name ← X2
        set_sort X2, id                    % X2 : id
W3  :   push_cell X3                       % X3 : string
        set_feature X3, first, X4          % X3 first ← X4
        set_sort X3, string                % X3 : string
        write_test 2, R2:                  %
W4  :   push_cell X4                       % X4 : string
        set_feature X4, last, X4           % X4 last ← X4
        set_sort X4, string                % X4 : string
        write_test 2, R2:                  %
        write_test 1, R3:                  %
W5  :   push_cell X5                       % X5 : person
        set_feature X5, spouse, X6         % X5 spouse ← X6
        set_sort X5, person                % X5 : person
W6  :   push_cell X6                       % X6 : id
        set_feature X6, name, X6           % X6 name ← X6
        set_sort X6, id                    % X6 : id
W_fin:  set_feature X4, last, X4           % X4 last ← X4
        write_test 1, R3:                  %
        write_test 2, R3:                  %
W_fin:  set_feature X5, spouse, X1         % X5 spouse ← X1
        write_test 2, R3:                  %
        write_test 1, R3:                  %
        write_test 0, R4:                  %
W6  :   :                                  %
```

Figure 9 Code for program OSF term (1)

… then witnessing a lasting impact





Outline

Calling for preservation: UNESCO

Experts call for greater recognition of software source code as heritage for sustainable development

.6 November 2018

UNESCO, Inria, Software Heritage invite

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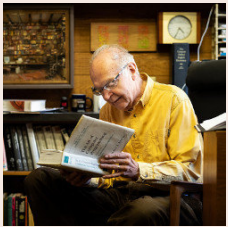
https://en.unesco.org/foss/paris-call-software-source-code

Calling for preservation: Donald Knuth and Len Shustek

Communications of the ACM, February 2021



"Telling historical stories is the best way to teach. It's much easier to understand something if you know the threads it is connected to."

Let's Not Dumb Down the History of Computer Science
Donald E. Knuth, Len Shustek
https://doi.org/10.1145/3442377

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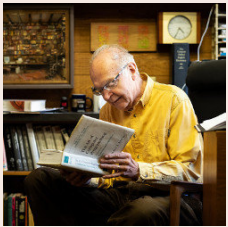

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A unique opportunity

most of the creators are still here: we can talk to them!

but the clock is ticking…

We need a universal archive of software source code:

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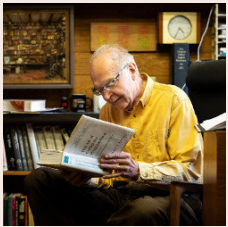

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We need a universal archive of software source code: now we have one!

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Software Heritage

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Collect, preserve and share *all* software source code

Preserving our heritage, enabling better software and better science for all

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Research infrastructure

enable analysis of all software source code

One infrastructure
open and shared

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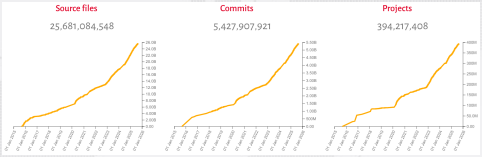
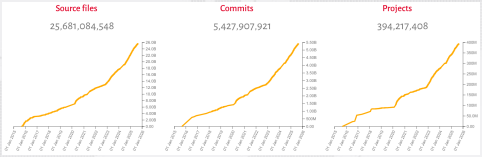


Largest archive

One infrastructure
open and shared



Largest archive

Technology

- transparency and FOSS
- replicas all the way down

Content (billions!)

- intrinsic identifiers
- facts and provenance

Organization

- non-profit
- multi-stakeholder

Sharing the vision

UNESCO
United Nations Educational, Scientific and Cultural Organization

And many more ...
www.softwareheritage.org/support/testimonials

Donors, members, sponsors

Inria

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cnes SCANOSS Sant'Anna Université de Lille

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Paris Call on Software Source Code

"[We call to] support efforts to gather and preserve the artifacts and narratives of the history of computing, while the earlier creators are still alive"

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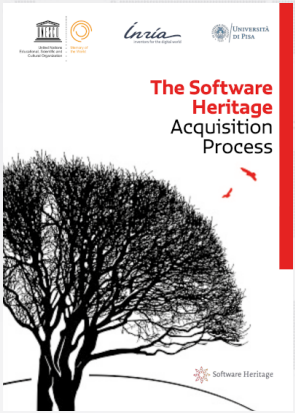

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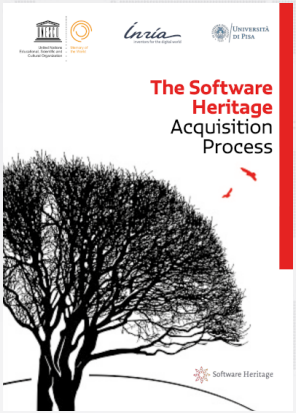

- Rescue Legacy Software from different media
  - physical
  - digital
    - legacy / unsupported
    - recent / supported

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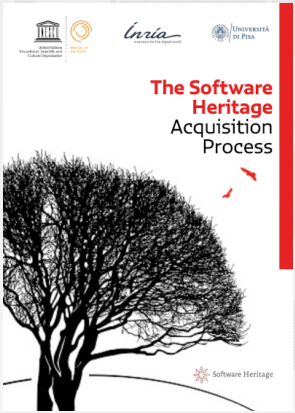

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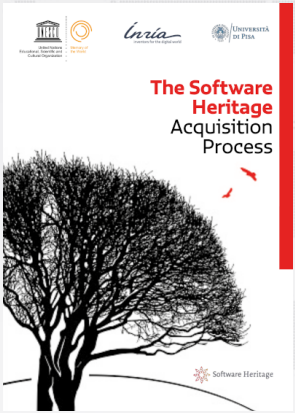

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- And illustrate with dedicated presentations

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see this live on the Software Stories website, and get *the guide*

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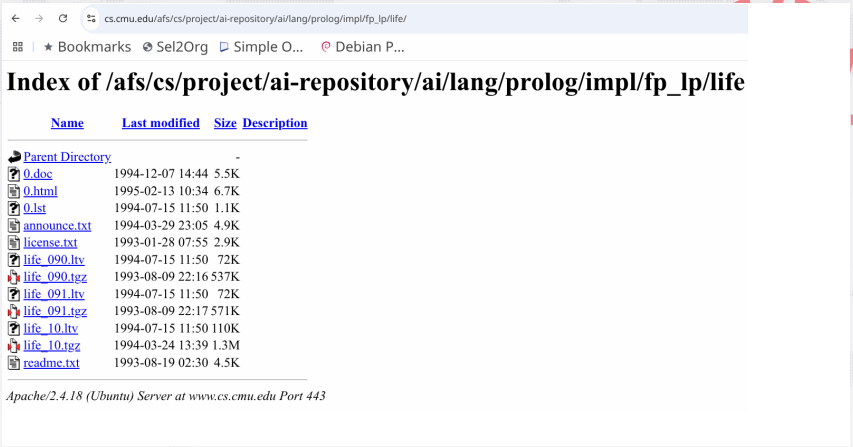
Outline

Finding Wild Life

Search engines are (more or less) your friends: CMU has it!



AI full circle…

ChatGPT 5 Thinking

Great, now let's make an exercise on a real world case. Let's consider the code source de LIFE / Wild LIFE (le système de LIFE développé au PRL de Digital par l'équipe incluant Hassan Aït-Kaci) :

Dépôt CMU AI Repository (archives officielles) — contient les tarballs life_090.tgz, life_091.tgz et life_10.tgz avec le code C et LIFE de l'interpréteur Wild_LIFE, le README et la licence DEC (non-commerciale).

Indication rapide : https://www.cs.cmu.edu/afs/cs/project/ai-repository/ai/lang/prolog/impl/fp_lp/life/
et la life_10.tgz est la dernière archive listée (1.3 MB, datée 1994-03-24). Propose a step by step series of commands to get the original material, and then process it according to the SWHAP official guide.

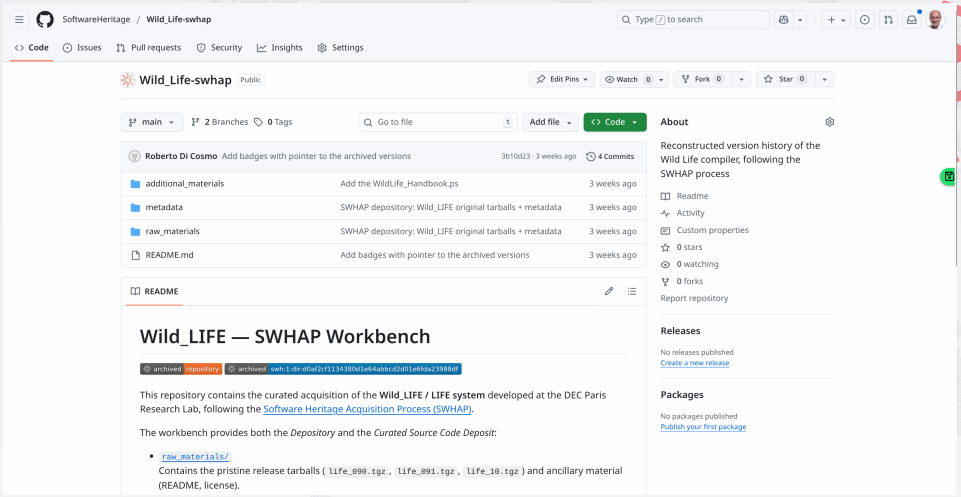
Thought for 1m 15s

Awesome choice. Here's a clean, reproducible SWHAP workflow for **LIFE / Wild_LIFE** from the CMU AI Repository. I give you:

- a **one-shot Bash recipe** (download → verify → structure → metadata → Git reconstruction)
- plus the **alternative "archives" ingestion** path on Software Heritage (no Git reconstruction)

I've inlined exact URLs, dates, and license info from CMU's listing and files so your curation trail is airtight. CMU School of C... +2

LIFE (source code) saved!



See the GitHub repository, flash:

A call for action

More memories from Hassan's LIFE?

Open a pull request in the repository at https://github.com/SoftwareHeritage/Wild_Life-swhap and add them to:

- raw-materials if it's code
- additional-materials otherwise (papers, pictures…)

Floor is yours!