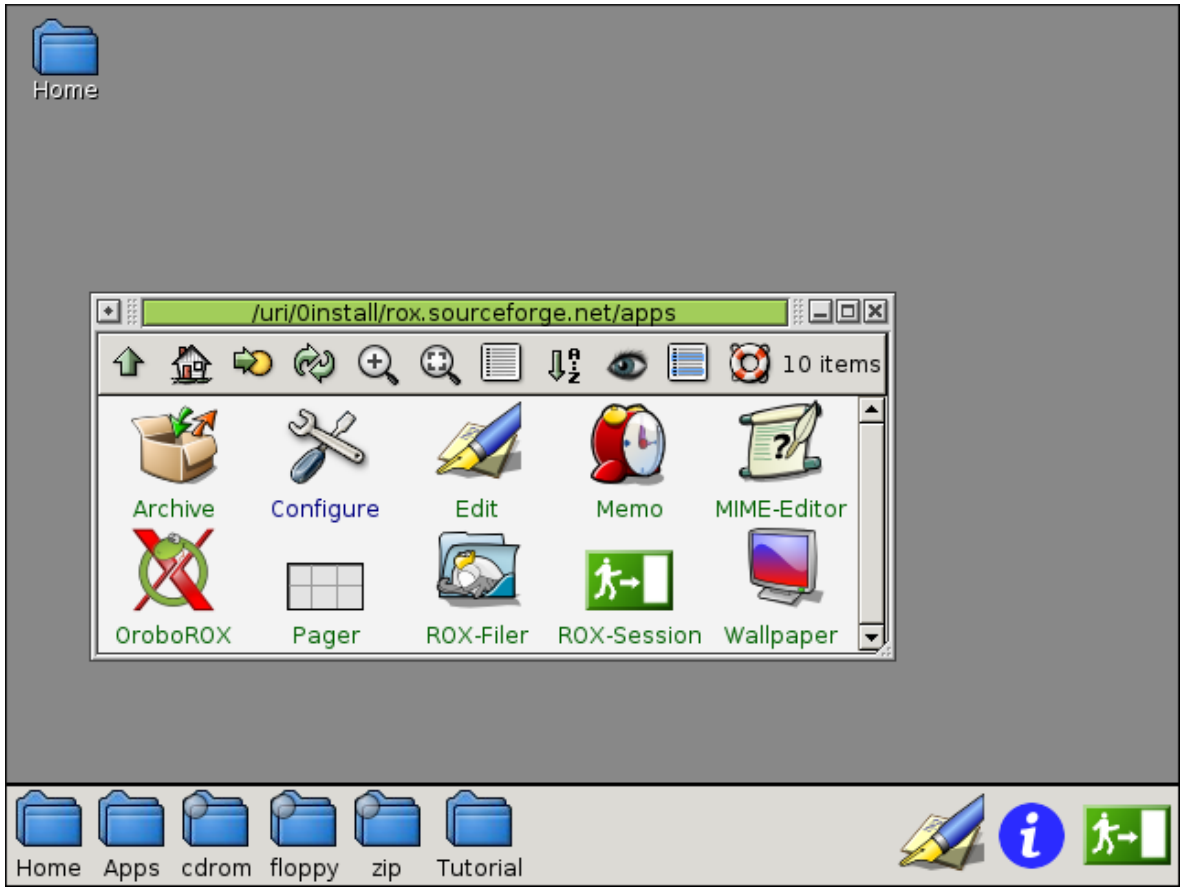
Zero Install

Decentralised cross-platform package management

Thomas Leonard / University of Cambridge / @talex5
OCaml 2014, Gothenburg, Sweden, September 5, 2014

History

Started the ROX desktop in 1999...



Distribution problems

- Multiple packages needed
  - Debian, Red Hat, SUSE, ...
- Poor, missing or out-of-date packages
  - Everyone should have access to every version
- Slow feedback cycle
  - Bug reports are for last year's version

Zero Install (2003)

- Make one package that works everywhere
  - Linux, OS X, Unix, Windows
- Packages can come directly from upstream
  - (or from distribution)
- Switch to latest version easily

Availability

Zero Install is in most Linux distributions, e.g.

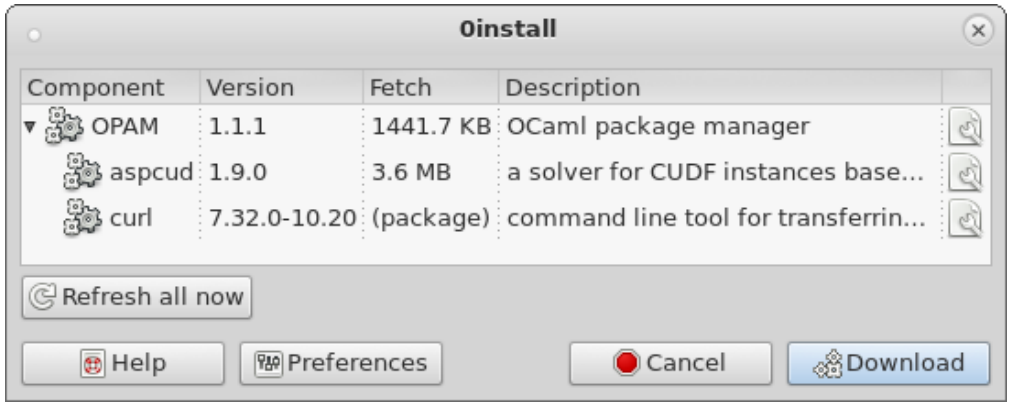
```
$ yaourt -S zeroinstall-injector            # Arch
$ sudo apt-get install zeroinstall-injector # Debian, Ubuntu
$ sudo yum install 0install                 # Fedora
$ sudo zypper install zeroinstall-injector  # OpenSUSE
```

OS X bundle and Windows .exe available too.

http://0install.net

Example: OPAM

```
$ 0install add opam http://tools.ocaml.org/opam.xml
```




```
$ opam --version
1.1.1
```

Where did it go?

```
$ 0install show opam
- URI: http://tools.ocaml.org/opam.xml
  Version: 1.1.1
  Path: /home/test/.cache/0install.net/implementations/
        sha256new_RUOX6PWGDCHH5TDNEDRHQJ54YZZ4TSAGBB5AEBRNOKSHM3N7XORA

  - URI: http://repo.roscidus.com/utils/aspcud
    Version: 1.9.0
    Path: /home/test/.cache/0install.net/implementations/
          sha1new=5f838f78e489dabc2e2965ba100f14ae8350cbce

  - URI: http://repo.roscidus.com/utils/curl
    Version: 7.32.0-10.20
    Path: (package:rpm:curl:7.32.0-10.20:x86_64)
```

(one 0install package and two distribution-provided dependencies)

Upgrading

By default, 0install prefers "stable" releases:

```
$ 0install update opam
A later version (http://tools.ocaml.org/opam.xml 1.2.0-pre4)
exists but was not selected. Using 1.1.1 instead.
To select "testing" versions, use:
0install config help_with_testing True
```

Can change this globally, or by adding a local version restriction:

```
$ 0install update opam --not-before=1.2.0-pre4
http://tools.ocaml.org/opam.xml: 1.1.1 -> 1.2.0-pre4
$ opam --version
1.2.0~beta4
```

Viewing changes

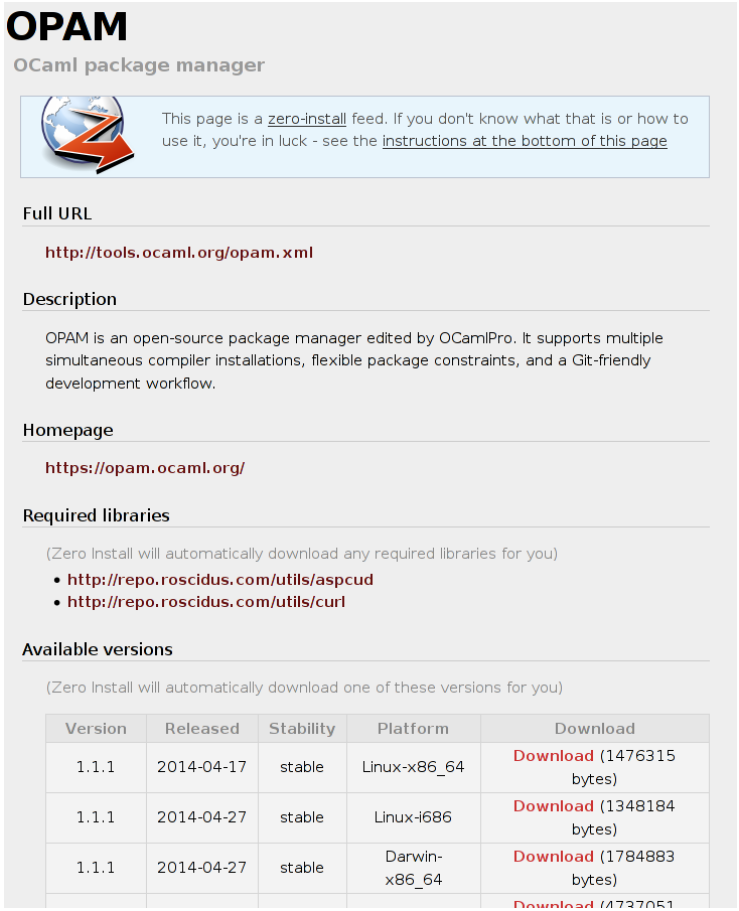
```
$ 0install whatchanged opam
Last checked    : 2014-08-26 11:00
Last update     : 2014-08-26
Previous update : 2014-07-03

http://tools.ocaml.org/opam.xml: 1.1.1 -> 1.2.0-pre4

To run using the previous selections, use:
0install run /home/tal/.config/0install.net/apps/opam/
  selections-2014-07-03.xml
```

Publishing

Put up a web-page with your package's details:



OPAM

OCaml package manager

This page is a zero-install feed. If you don't know what that is or how to use it, you're in luck - see the instructions at the bottom of this page

Full URL

http://tools.ocaml.org/opam.xml

Description

OPAM is an open-source package manager edited by OCamlPro. It supports multiple simultaneous compiler installations, flexible package constraints, and a Git-friendly development workflow.

Homepage

https://opam.ocaml.org/

Required libraries

(Zero Install will automatically download any required libraries for you)

- http://repo.roscidus.com/utils/aspcud
- http://repo.roscidus.com/utils/curl

Available versions

(Zero Install will automatically download one of these versions for you)

Version	Released	Stability	Platform	Download
1.1.1	2014-04-17	stable	Linux-x86_64	Download (1476315 bytes)
1.1.1	2014-04-27	stable	Linux-i686	Download (1348184 bytes)
1.1.1	2014-04-27	stable	Darwin-x86_64	Download (1784883 bytes)

It's actually XML

```
<?xml version="1.0" ?>
<?xml-stylesheet type='text/xsl' href='resources/feed.xsl'?>
<interface uri="http://tools.ocaml.org/opam.xml" xmlns="http://zero-install.s
  <name>OPAM</name>
  <summary>OCaml package manager</summary>

  <description>
    OPAM is an open-source package manager edited by OCamlPro. It
    supports multiple simultaneous compiler installations, flexible
    package constraints, and a Git-friendly development workflow.
  </description>

  <homepage>https://opam.ocaml.org/</homepage>

  <group license="OSI Approved :: GNU Lesser General Public License (LGPL)">
    <group>
      <requires interface="http://repo.roscidus.com/utils/aspcud"
                importance="recommended">
```

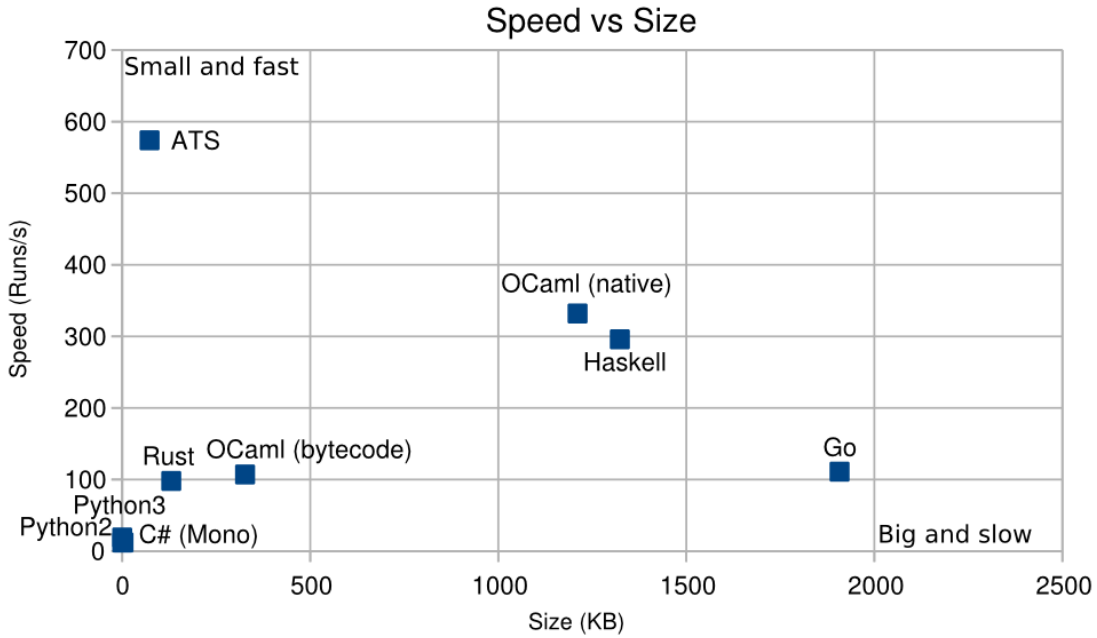
End of Part I

Questions?

Python problems (2013)

- Python 0install too slow:
  - On mobile platforms
  - Running small utilities
- Too unreliable:
  - No static checking
  - Python 3 breakage
  - PyGTK breakage
- So started looking for a new language...

Language comparison



http://roscidus.com/blog/blog/2013/06/09/choosing-a-python-replacement-for-0install/

OCaml: 1st impressions

- Bad:
  - Top-level: no readline support!?!
  - Syntax errors hard to find
    - (not sensitive to indentation errors)
  - Unhelpful errors: Not_found
  - Binary compatibility (of OCaml libraries)
- Good:
  - Fast!
  - Reliable
  - Mature
  - Direct equivalents to Python features
  - "Obvious" compiler behaviour

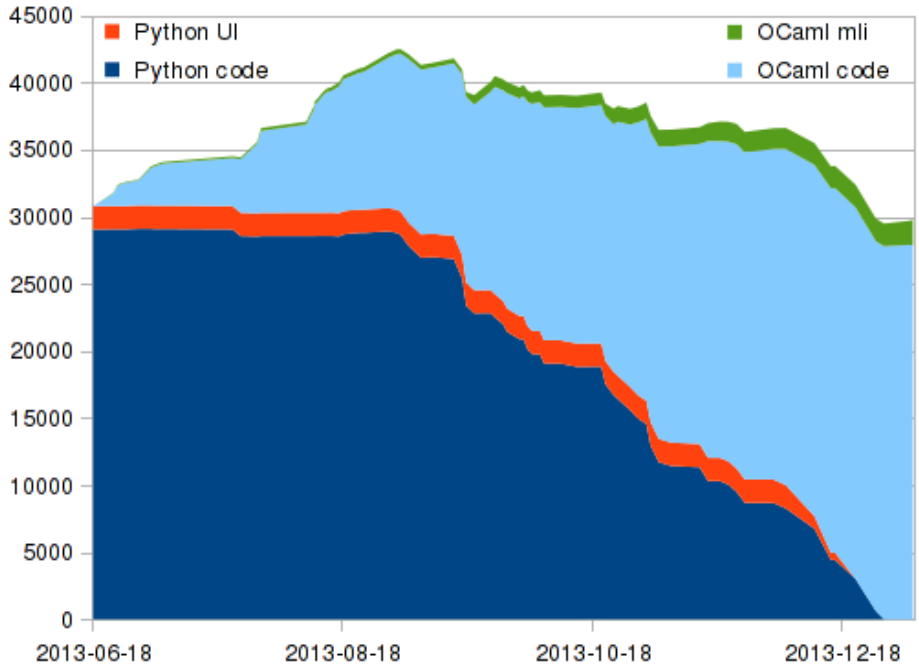
Suggestion: OCaml for...

- Python users: fast, static checking, unicode
- Java users: fast startup, no NullPointerExceptions
- Everyone: polymorphic variants, functors, abstract types

http://roscidus.com/blog/blog/2014/02/13/ocaml-what-you-gain/

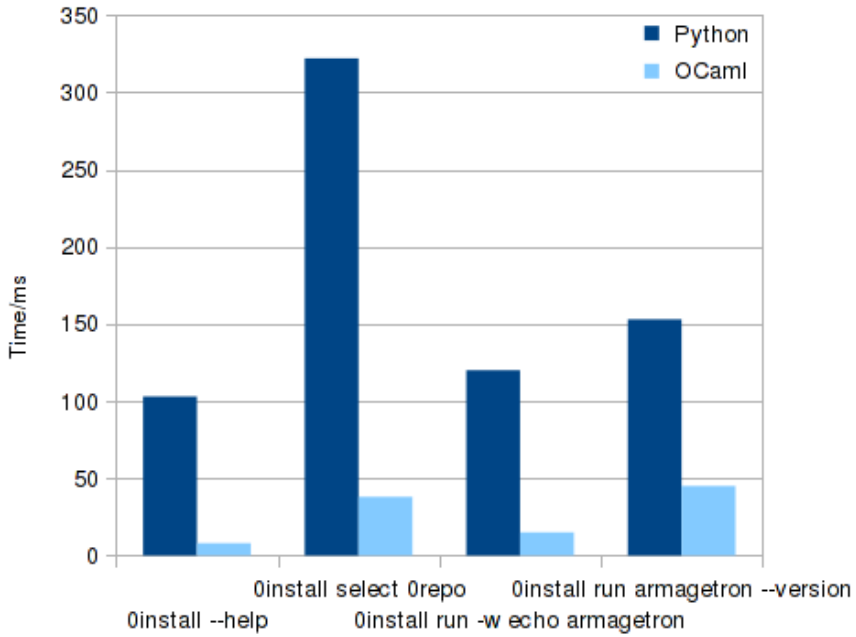
Porting process

- Used old Python and new OCaml parts together.
- Communication was via JSON.
- Literal translation first; refactor later in OCaml.



Results

- Similar LOC (OCaml slightly shorter)
- OCaml around 10x faster
- Seems very reliable
- Community very helpful!



http://roscidus.com/blog/blog/2014/06/06/python-to-ocaml-retrospective/

Feedback

"I found modifying an unfamiliar OCaml codebase much easier than a Python one. [...] the explicit .mli files give a good summary of each module's surface area, [...] modifying the type of something and then fixing the errors gives you a good way to start figuring out how to actually enact a certain change."

-- Tim Cuthbertson (0install developer)

THE END

For more information:

http://0install.net/

http://roscidus.com/blog/blog/categories/ocaml/

Questions?