OASIS
Architecture for building OCaml libraries and applications

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Presentation at OCaml Meeting 2010
April 16th, 2010

How it started

- Started in July 2008:
  - Prototype made of code gathered from 3 other small projects
  - I did a summary of problems that a Debian packager has to deal with when packaging an OCaml library (blog article)
  - Mauricio Fernandez provided a small implementation of Cabal like system
- Since then:
  - I added features when new projects needed it
  - The project was renamed from OCamlAutobuild to OASIS
- Release 0.1.0 (2010/04/08)

Debian problems

- Non-native architectures
- Not using ocamlfind for libraries
- Custom build system

Requirements

- We need at least the following steps:
  - Configure: checks build environment, allows to disable/enable features
  - Build: creates libraries and executables
  - Install: moves results to the right place
- We can use
  - OCaml as a scripting language
  - Findlib to manage libraries
  - OCamlbuild, OMake, OcamlMakefile
- We should avoid
  - Shell scripts and Unix commands
  - Adding dependencies
  - Forcing projects to change things that work
  - Reinventing the wheel

Cabal!

Cabal is a system for building and packaging Haskell libraries and programs. It defines a common interface for package authors and distributors to easily build their applications in a portable way

http://www.haskell.org/cabal/

- This is a building brick of Hackage (CPAN for Haskell)
- It makes really easy to use external libraries
- It is based on a single text file: pkg.cabal
- It is probably one of the reason of the Haskell's success

_oasis

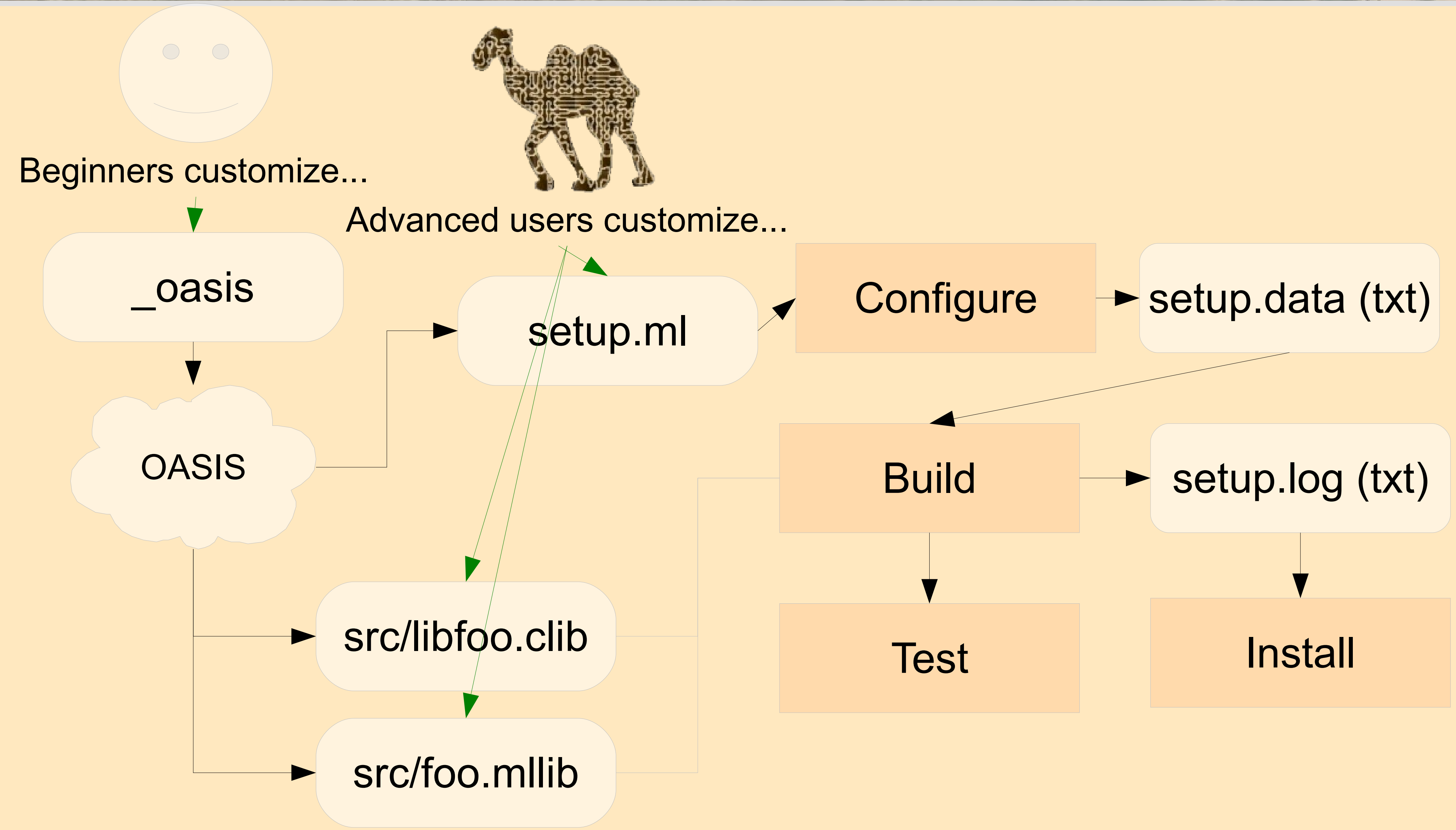
- Copy Cabal file format
  - Fields
  - Sections
  - Freeform
  - Conditional
- Simple text file
  - Easy to read and write
  - Beginners can understand it

```
OASISFormat: 0.1
Name:        with-c
Version:     0.0.1
Authors:     Sylvain Le Gall
LicenseFile: LICENSE
License:     LGPL with OCaml linking
  exception
Synopsis:    Minimal project with C file.
Plugins:     META

Library "with-c"
  Path: src
  Modules: A
  CSources: A_stub.c

Executable "test-with-c"
  Path: src
  MainIs: main.ml
  CompiledObject: byte
  BuildDepends: with-c
  CSources: main_stub.c
```

Compilation

- It compiles “_oasis” into a build system:
  - “setup.ml” is the entry point
  - It uses plugins to compile sub systems
- External commands when stdlib is not enough:
  - ocamlfind
  - ocamlc -config
  - cp, rm (Sys.os_type dependent)
- External libraries only at compile time

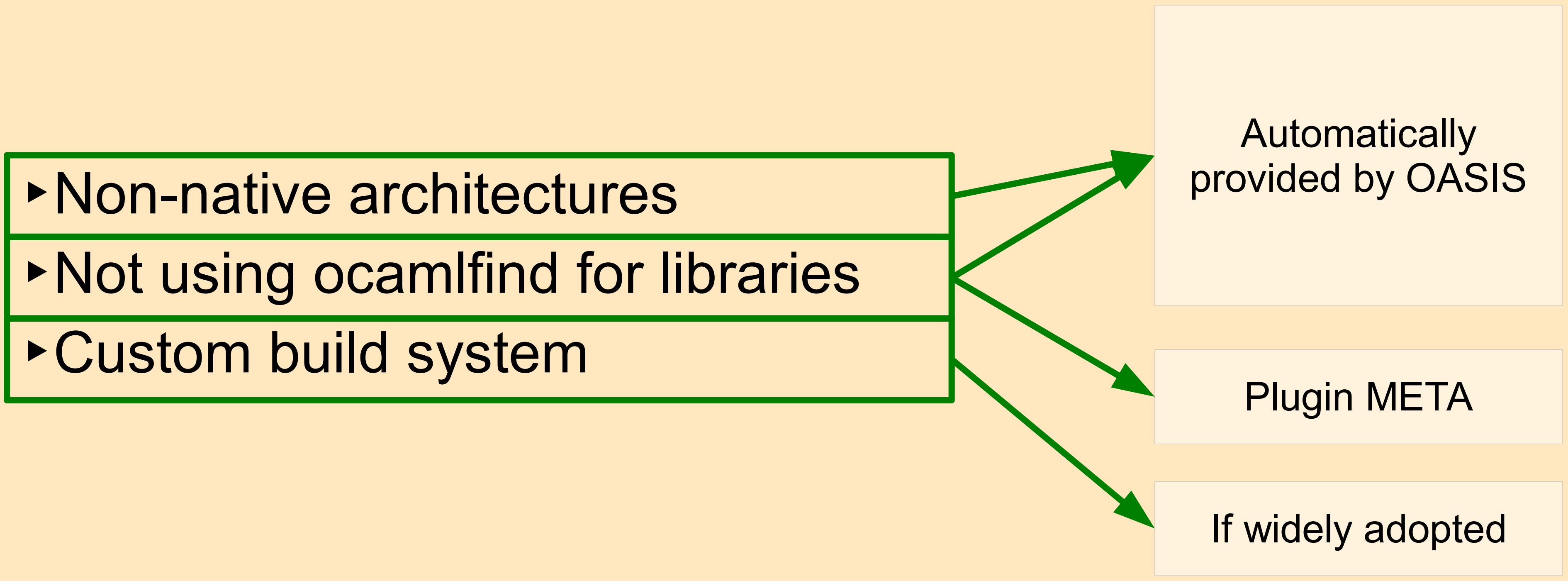
How it works


Beginners customize...
Advanced users customize...
_oasis
OASIS
setup.ml
Configure
setup.data (txt)
Build
setup.log (txt)
src/libfoo.clib
src/foo.mllib
Test
Install

Is it working well?

- It scales well from small libraries to projects with several libraries and executables
- Easy to extend through plugins
- It still needs to create a huge “setup.ml” (~120kB)

Back to Debian problems


▸Non-native architectures
▸Not using ocamlfind for libraries
▸Custom build system
Automatically provided by OASIS
Plugin META
If widely adopted

Future projects

- oasis-selfcontained:
  - to create .tar.gz containing everything required to build
- oasis-checkout:
  - to checkout VCS of a package or a particular version
- bocage.ocamlcore.org which should enable to:
  - Upload "_oasis" file
  - Translate it to web pages
  - Translate it to GODI files

Conclusion

- Still a lot of work to do (OMake, OcamlMakefile)
- It creates a standard and portable full build system
- Creating Debian packages is easier
- It is a building brick for an Hackage in OCaml for OCaml

Demonstration

Questions ?

Extras

What are plugins?

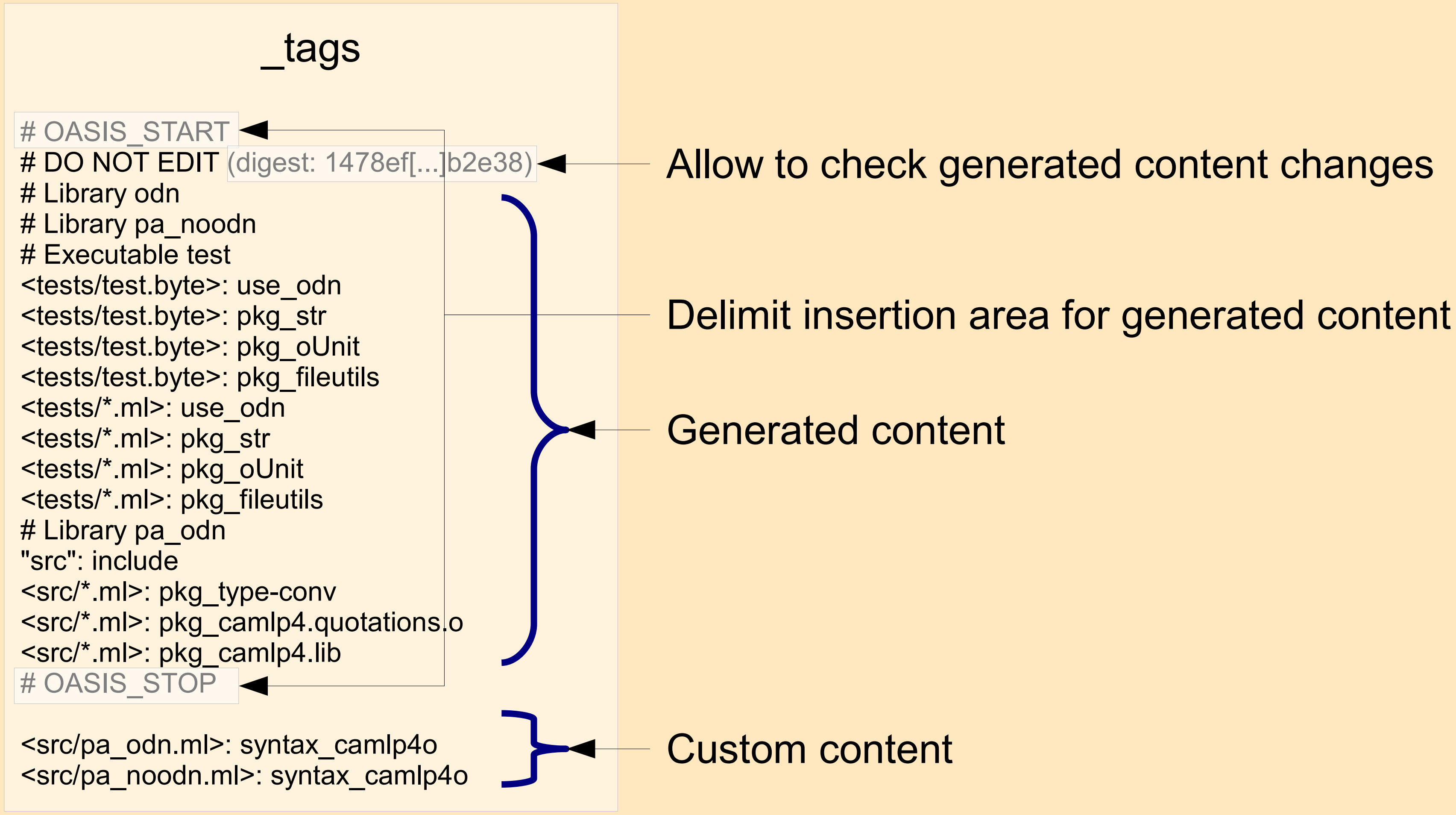
- It translates an OASIS package data structure
- There are four kinds:
  - Conf
  - Build
  - Test
  - Doc
  - Install
  - Extra
- It can create extra fields in "_oasis"
  - "XCustomClean: $make clean"
- It can embed code into "setup.ml"

Some plugins

- None (conf, build, doc, test, install)
  - It does nothing and fail
- Custom (conf, build, doc, test, install)
  - It calls a shell command
- OCamlbuild (build)
  - It generates .mllib
  - It calsl ocamlbuild with the right targets (e.g "ocamlbuild test.cma" or "ocamlbuild test.cma test.cmxa")
- OcamlbuildDoc (doc)
  - It generates .odocl
- InternalInstall (install)
  - It installs what has been built using ocamlfind or cp
- META (extra)
  - It creates META files including build dependencies

Customization

Generated files



_tags

```
# OASIS_START
# DO NOT EDIT (digest: 1478ef[...]b2e38)
# Library odn
# Library pa_noodn
# Executable test
<tests/test.byte>: use_odn
<tests/test.byte>: pkg_str
<tests/test.byte>: pkg_oUnit
<tests/test.byte>: pkg_fileutils
<tests/*.ml>: use_odn
<tests/*.ml>: pkg_str
<tests/*.ml>: pkg_oUnit
<tests/*.ml>: pkg_fileutils
# Library pa_odn
"src": include
<src/*.ml>: pkg_type-conv
<src/*.ml>: pkg_camlp4.quotations.o
<src/*.ml>: pkg_camlp4.lib
# OASIS_STOP

<src/pa_odn.ml>: syntax_camlp4o
<src/pa_noodn.ml>: syntax_camlp4o
```

Allow to check generated content changes

Delimit insertion area for generated content

Generated content

Custom content

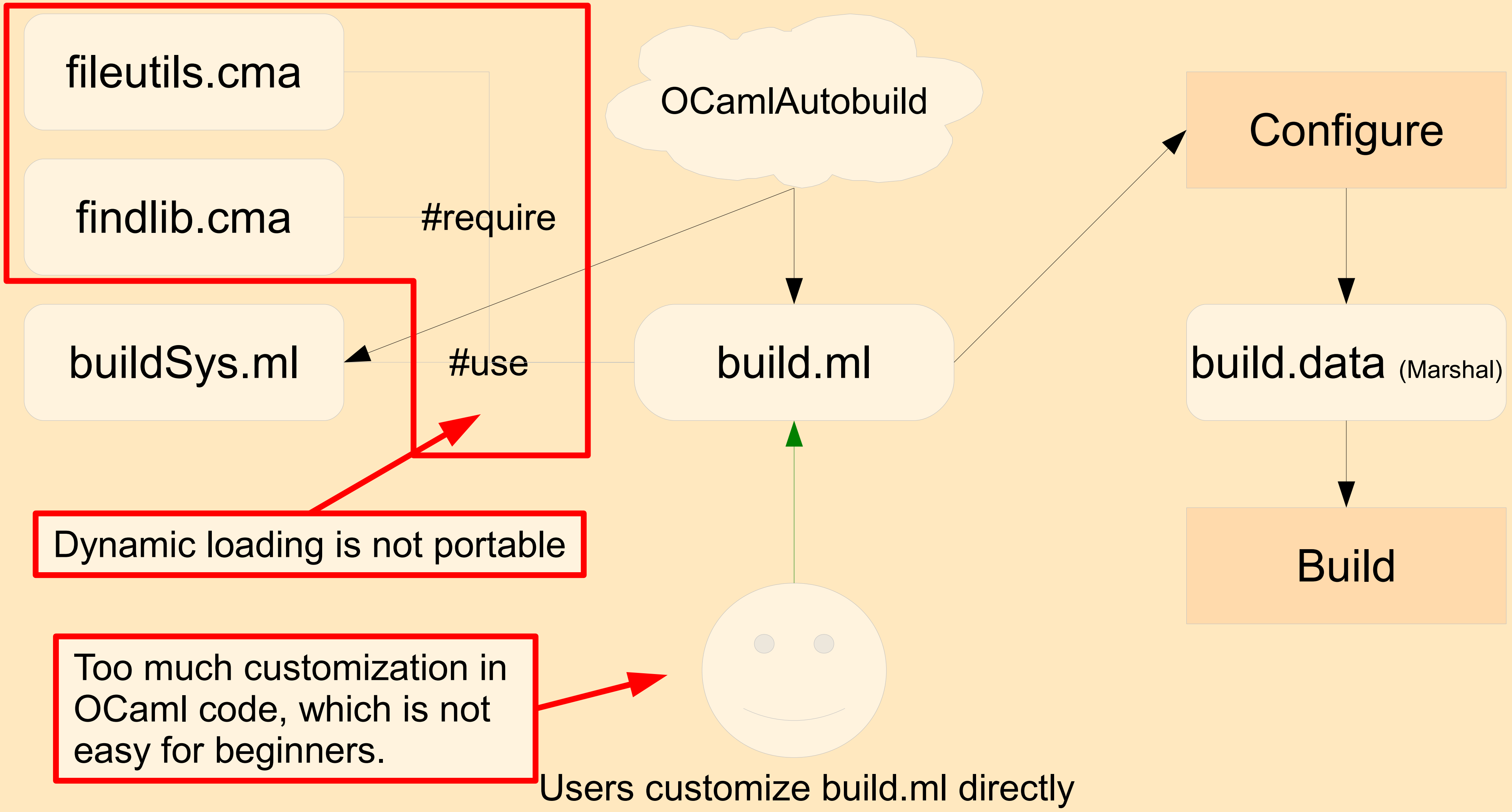
Variables

- The general form is “$var”
- It can be recursive:
  - $docdir
  - → $datarootdir/doc/$pkg_name
  - → $prefix/share/doc/ocamlify
  - → /usr/local/share/doc/ocamlify
- You can use functions to transform it:
  - utoh: Unix to host for filename
  - ocaml_escaped: String.escaped
- Origin:
  - Default value
  - From file “setup.data” (static after configure step)
  - From file “setup.log” (change each time you build something)
  - From command line
  - Environment

Bocage

- Main goal: Hackage/CPAN for OCaml
- Should integrate with forge.ocamlcore.org:
  - User accounts and login done through the forge
  - When you upload an OASIS enabled package to the forge, it is automatically published into bocage.o.o
  - Documentation will be shared with the document section of the forge
  - If home web page is not set, redirect to the bocage web page of the package
- Tarball won't be stored:
  - Link to upstream website (to centralize download count)
  - Backup to another website (archives.ocamlcore.org?)
- Information about VCS
- Should integrate 2 alternate GODI repositories
  - Stable: no build problems (howto decide stable -> unstable migration)
  - Unstable: everything published

First version



Dynamic loading is not portable

Too much customization in OCaml code, which is not easy for beginners.

Users customize build.ml directly

This first version works for small projects but doesn't scale