

A Short Introduction to Autotools

Danny Robson

November 25, 2008

Parts drawn from: Alexandre Duret-Lutz's 'Introduction to the GNU Build System and GNU Autotools'

1 What is autotools?

2 A Basic Project

- Setup
 - autoconf
 - automake
- Compiling
- Distribution

3 Further

Outline

A Short
Introduction
to Autotools

Danny Robson

Outline

What is
autotools?

A Basic
Project

Setup

autoconf

automake

Compiling

Distribution

Further

1 What is autotools?

2 A Basic Project

- Setup
 - autoconf
 - automake
- Compiling
- Distribution

3 Further

What is autotools?

A Short
Introduction
to Autotools

Danny Robson

Outline

What is
autotools?

A Basic
Project

Setup

autoconf

automake

Compiling

Distribution

Further

- 'Those three commands...'

```
danny@lister ~/foo $ ./configure  
danny@lister ~/foo $ make  
danny@lister ~/foo $ make install
```

Why?

A Short
Introduction
to Autotools

Danny Robson

Outline

What is
autotools?

A Basic
Project

Setup
autoconf
automake
Compiling
Distribution

Further

- Why use it?
 - Useful makefile targets
 - `clean`, `install`, `uninstall`, `dist`, `check`, `distcheck`
 - Supporting tools
 - `pkg-config`, `gnulib`
 - Portability and configuration

Why?

A Short
Introduction
to Autotools

Danny Robson

Outline

What is
autotools?

A Basic
Project

Setup
autoconf
automake
Compiling
Distribution

Further

- Why use it?
 - Useful makefile targets
 - `clean`, `install`, `uninstall`, `dist`, `check`, `distcheck`
 - Supporting tools
 - `pkg-config`, `gnulib`
 - Portability and configuration
 - All the cool kids are doing it...

Why?

A Short
Introduction
to Autotools

Danny Robson

Outline

What is
autotools?

A Basic
Project

Setup
autoconf
automake
Compiling
Distribution

Further

- Why use it?
 - Useful makefile targets
 - `clean`, `install`, `uninstall`, `dist`, `check`, `distcheck`
 - Supporting tools
 - `pkg-config`, `gnulib`
 - Portability and configuration
 - All the cool kids are doing it...
- Why leave it?
 - GNU all the way

What does autotools consist of?

A Short
Introduction
to Autotools

Danny Robson

Outline

What is
autotools?

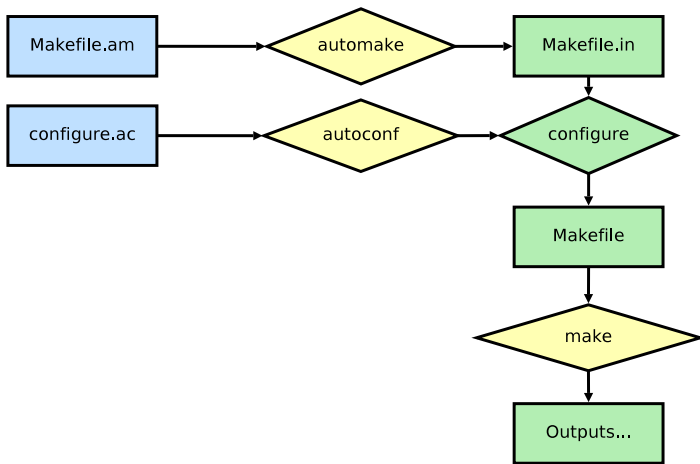
A Basic
Project

Setup
 autoconf
 automake
 Compiling
 Distribution

Further

- autoconf
- automake
- autoheader
- libtool
- ...

Simple automake/autoconf data flow



A Short
Introduction
to Autotools

Danny Robson

Outline

What is
autotools?

A Basic
Project

Setup

autoconf

automake

Compiling

Distribution

Further

Outline

A Short
Introduction
to Autotools

Danny Robson

Outline

What is
autotools?

A Basic
Project

Setup
autoconf
automake
Compiling
Distribution

Further

1 What is autotools?

2 A Basic Project

- Setup
 - autoconf
 - automake
- Compiling
- Distribution

3 Further

A basic *configure.ac*

A Short
Introduction
to Autotools

Danny Robson

Outline

What is
autotools?

A Basic
Project

Setup
autoconf
automake
Compiling
Distribution

Further

configure.ac

```
AC_INIT([helloworld], [2.7.4], [fred@nerks.com])  
AM_INIT_AUTOMAKE
```

```
AC_PROG_CC
```

```
AC_OUTPUT([Makefile])
```

- A skeleton input for autoconf

A basic *configure.ac*

A Short
Introduction
to Autotools

Danny Robson

Outline

What is
autotools?

A Basic
Project

Setup
autoconf
automake
Compiling
Distribution

Further

configure.ac

```
AC_INIT([helloworld], [2.7.4], [fred@nerks.com])
```

```
AM_INIT_AUTOMAKE
```

```
AC_PROG_CC
```

```
AC_OUTPUT([Makefile])
```

- Initialise autoconf: project, version, bug reporting

A basic *configure.ac*

A Short
Introduction
to Autotools

Danny Robson

Outline

What is
autotools?

A Basic
Project

Setup
autoconf
automake
Compiling
Distribution

Further

configure.ac

```
AC_INIT([helloworld], [2.7.4], [fred@nerks.com])
```

```
AM_INIT_AUTOMAKE
```

```
AC_PROG_CC
```

```
AC_OUTPUT([Makefile])
```

- Initialise automake

A basic *configure.ac*

A Short
Introduction
to Autotools

Danny Robson

Outline

What is
autotools?

A Basic
Project

Setup
autoconf
automake
Compiling
Distribution

Further

configure.ac

```
AC_INIT([helloworld], [2.7.4], [fred@nerks.com])  
AM_INIT_AUTOMAKE
```

```
AC_PROG_CC
```

```
AC_OUTPUT([Makefile])
```

- Check for C compilers

A basic *configure.ac*

A Short
Introduction
to Autotools

Danny Robson

Outline

What is
autotools?

A Basic
Project

Setup
autoconf
automake
Compiling
Distribution

Further

configure.ac

```
AC_INIT([helloworld], [2.7.4], [fred@nerks.com])  
AM_INIT_AUTOMAKE
```

```
AC_PROG_CC
```

```
AC_OUTPUT([Makefile])
```

- Specify which files should be generated

A basic *Makefile.am*

A Short
Introduction
to Autotools

Danny Robson

Outline

What is
autotools?

A Basic
Project

Setup
autoconf
automake
Compiling
Distribution

Further

Makefile.am

```
bin_PROGRAMS = helloworld
```

```
helloworld_SOURCES = helloworld.c
```

```
helloworld_LDADD = -lm
```

- A skeleton input for automake

A basic *Makefile.am*

A Short
Introduction
to Autotools

Danny Robson

Outline

What is
autotools?

A Basic
Project

Setup
autoconf
automake
Compiling
Distribution

Further

Makefile.am

```
bin_PROGRAMS = helloworld
```

```
helloworld_SOURCES = helloworld.c
```

```
helloworld_LDADD = -lm
```

- A list of targets to build

A basic *Makefile.am*

A Short
Introduction
to Autotools

Danny Robson

Outline

What is
autotools?

A Basic
Project

Setup
autoconf
automake
Compiling
Distribution

Further

Makefile.am

```
bin_PROGRAMS = helloworld
```

```
helloworld_SOURCES = helloworld.c
```

```
helloworld_LDADD = -lm
```

- What?

A basic *Makefile.am*

A Short
Introduction
to Autotools

Danny Robson

Outline

What is
autotools?

A Basic
Project

Setup
autoconf
automake
Compiling
Distribution

Further

Makefile.am

```
bin_PROGRAMS = helloworld
```

```
helloworld_SOURCES = helloworld.c
```

```
helloworld_LDADD = -lm
```

- Where?

A basic *Makefile.am*

A Short
Introduction
to Autotools

Danny Robson

Outline

What is
autotools?

A Basic
Project

Setup
autoconf
automake
Compiling
Distribution

Further

Makefile.am

```
bin_PROGRAMS = helloworld
```

```
helloworld_SOURCES = helloworld.c
```

```
helloworld_LDADD = -lm
```

- Source components for target

A basic *Makefile.am*

A Short
Introduction
to Autotools

Danny Robson

Outline

What is
autotools?

A Basic
Project

Setup
autoconf
automake
Compiling
Distribution

Further

Makefile.am

```
bin_PROGRAMS = helloworld
```

```
helloworld_SOURCES = helloworld.c
```

```
helloworld_LDADD = -lm
```

- Link arguments for target

The standard *autogen.sh*

A Short
Introduction
to Autotools

Danny Robson

Outline

What is
autotools?

A Basic
Project

Setup
autoconf
automake

Compiling
Distribution

Further

autogen.sh

```
#!/bin/sh  
aclocal  
autoconf  
autoheader  
automake
```

- The 'standard' `autogen.sh`

The standard *autogen.sh*

A Short
Introduction
to Autotools

Danny Robson

Outline

What is
autotools?

A Basic
Project

Setup
autoconf
automake

Compiling
Distribution

Further

autogen.sh

```
#!/bin/sh  
aclocal  
autoconf  
autoheader  
automake
```

- The 'standard' `autogen.sh`
- Or just use `autoreconf`

Starting off

A Short
Introduction
to Autotools

Danny Robson

Outline

What is
autotools?

A Basic
Project

Setup
autoconf
automake

Compiling
Distribution

Further

Commands

```
$ vim configure.ac  
$ vim Makefile.am  
$ touch NEWS README AUTHORS ChangeLog  
$ autoreconf --install  
$ ./configure  
$ make
```

Starting off

A Short
Introduction
to Autotools

Danny Robson

Outline

What is
autotools?

A Basic
Project

Setup
autoconf
automake

Compiling
Distribution

Further

Commands

```
$ vim configure.ac
```

```
$ vim Makefile.am
```

```
$ touch NEWS README AUTHORS ChangeLog
```

```
$ autoreconf --install
```

```
$ ./configure
```

```
$ make
```

Starting off

A Short
Introduction
to Autotools

Danny Robson

Outline

What is
autotools?

A Basic
Project

Setup
autoconf
automake

Compiling
Distribution

Further

Commands

```
$ vim configure.ac  
$ vim Makefile.am  
$ touch NEWS README AUTHORS ChangeLog  
$ autoreconf --install  
$ ./configure  
$ make
```

Distributing your application

A Short
Introduction
to Autotools

Danny Robson

Outline

What is
autotools?

A Basic
Project

Setup

autoconf

automake

Compiling
Distribution

Further

Distribution targets

1 `make dist`

1 Good: Create a tarball

Distributing your application

A Short
Introduction
to Autotools

Danny Robson

Outline

What is
autotools?

A Basic
Project

Setup

autoconf

automake

Compiling
Distribution

Further

Distribution targets

- 1 `make dist`
- 2 `make distcheck`

- 1 Good: Create a tarball
- 2 Better: Create a tarball and test the installation

Outline

A Short
Introduction
to Autotools

Danny Robson

Outline

What is
autotools?

A Basic
Project

Setup

autoconf

automake

Compiling

Distribution

Further

1 What is autotools?

2 A Basic Project

- Setup
 - autoconf
 - automake
- Compiling
- Distribution

3 Further

Further reading

A Short
Introduction
to Autotools

Danny Robson

Outline

What is
autotools?

A Basic
Project

Setup
autoconf
automake
Compiling
Distribution

Further

- The **autobook**
- autoconf, automake info pages
- <http://www.lrde.epita.fr/~adl/autotools.html>

Further reading

A Short
Introduction
to Autotools

Danny Robson

Outline

What is
autotools?

A Basic
Project

Setup
autoconf
automake
Compiling
Distribution

Further

- The autobook
- autoconf, automake info pages
- <http://www.lrde.epita.fr/~adl/autotools.html>
- [Google](#)

Further reading

A Short
Introduction
to Autotools

Danny Robson

Outline

What is
autotools?

A Basic
Project

Setup

autoconf

automake

Compiling

Distribution

Further

- <http://cs.anu.edu.au/~Danny.Robson/>
 - A skeleton autotools project: 'autoskel'
 - The previous links

A Short
Introduction
to Autotools

Danny Robson

Outline

What is
autotools?

A Basic
Project

Setup

autoconf

automake

Compiling

Distribution

Further



Outline

A Short
Introduction
to Autotools

Danny Robson

Additional
Tricks

- 4 Additional
 - Tricks

Using pkg-config

A Short
Introduction
to Autotools

Danny Robson

Additional
Tricks

configure.ac

```
PKG_CHECK_MODULES(PCI, libpci >= 3.0.0)
```

Makefile.am

```
helloworld_CFLAGS = $(PCI_CFLAGS)  
helloworld_LDADD = $(PCI_LIBS)
```

A simple conditional

A Short
Introduction
to Autotools

Danny Robson

Additional
Tricks

configure.ac

```
PKG_CHECK_EXISTS(foo >= 3.0.0,  
[ HAVE_FOO=true ],  
[ HAVE_FOO=false ]  
)  
AM_CONDITIONAL(BUILD_FOO, [test x$HAVE_FOO = xtrue])
```

Makefile.am

```
if BUILD_FOO  
prog_SOURCES += foosupport.cpp foosupport.hpp  
endif
```