Compiling Software Packages

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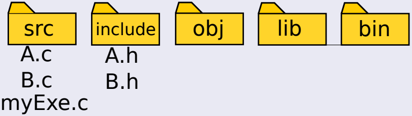
Makefile project

Directory structure



src: A.c, B.c, myExe.c

include: A.h, B.h

obj

lib

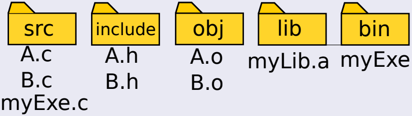
bin

Makefile

```
CC = gcc
CFLAGS = -I include -g -Wall -O2
LIBS = -Llib -lmyLib
.................
................
all: $(TARGET)
lib: $(LIB)

$(TARGET): $(LIB) src/myExe.c
  $(CC) src/myExe.c
$(CFLAGS) $(LIBS) -o $@

$(LIB): $(OBJ)
  ar -rc $(LIB) $(OBJ)

obj/%.o: src/%.c
  $(CC) $(CFLAGS)  -c $< -o $@

$(DOC): doc/myLib.tex
  cd doc && pdflatex -pdf myLib.tex

clean:
  $(RM) $(OBJ) $(TARGET)
  cd doc && pdflatex -c myLib.tex
```

Makefile project

Directory structure



src
A.c
B.c
myExe.c

include
A.h
B.h

obj
A.o
B.o

lib
myLib.a

bin
myExe

make command

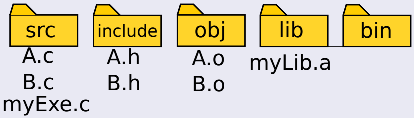
:$ make all

Makefile

```
CC = gcc
CFLAGS = -I include -g -Wall -O2
LIBS = -Llib -lmyLib
.................
................
all: $(TARGET)
lib: $(LIB)

$(TARGET): $(LIB) src/myExe.c
  $(CC) src/myExe.c
$(CFLAGS) $(LIBS) -o $@

$(LIB): $(OBJ)
  ar -rc $(LIB) $(OBJ)

obj/%.o: src/%.c
  $(CC) $(CFLAGS)  -c $< -o $@

$(DOC): doc/myLib.tex
  cd doc && pdflatex -pdf myLib.tex

clean:
  $(RM) $(OBJ) $(TARGET)
  cd doc && pdflatex -c myLib.tex
```

Makefile project

Directory structure



make command

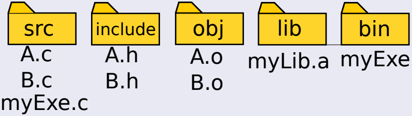
:$ make lib

Makefile

```
CC = gcc
CFLAGS = -I include -g -Wall -O2
LIBS = -Llib -lmyLib
................
...............
all: $(TARGET)
lib: $(LIB)

$(TARGET): $(LIB) src/myExe.c
  $(CC) src/myExe.c
$(CFLAGS) $(LIBS) -o $@

$(LIB): $(OBJ)
  ar -rc $(LIB) $(OBJ)

obj/%.o: src/%.c
  $(CC) $(CFLAGS)  -c $< -o $@

$(DOC): doc/myLib.tex
  cd doc && pdflatex -pdf myLib.tex

clean:
  $(RM) $(OBJ) $(TARGET)
  cd doc && pdflatex -c myLib.tex
```

Makefile project

Directory structure



src
A.c
B.c
myExe.c

include
A.h
B.h

obj
A.o
B.o

lib
myLib.a

bin
myExe

Limitations:

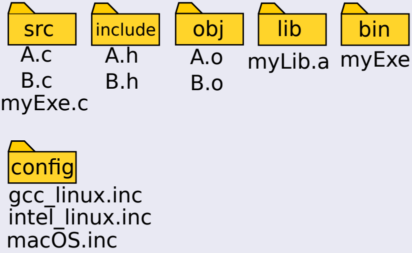
Platform Portability

Makefile

```
CC = gcc
CFLAGS = -I include -g -Wall -O2
LIBS = -Llib -lmyLib
.................
................
all: $(TARGET)
lib: $(LIB)

$(TARGET): $(LIB) src/myExe.c
  $(CC) src/myExe.c
$(CFLAGS) $(LIBS) -o $@

$(LIB): $(OBJ)
  ar -rc $(LIB) $(OBJ)

obj/%.o: src/%.c
  $(CC) $(CFLAGS)  -c $< -o $@

$(DOC): doc/myLib.tex
  cd doc && pdflatex -pdf myLib.tex

clean:
  $(RM) $(OBJ) $(TARGET)
  cd doc && pdflatex -c myLib.tex
```

Makefile project

Directory structure



src
A.c
B.c
myExe.c

include
A.h
B.h

obj
A.o
B.o

lib
myLib.a

bin
myExe

config
gcc_linux.inc
intel_linux.inc
macOS.inc

make command

```
:$ make all
```

Makefile

```
include make.inc
................
................
all: $(TARGET)
lib: $(LIB)

$(TARGET): $(LIB) src/myExe.c
  $(CC) src/myExe.c
$(CFLAGS) $(LIBS) -o $@

$(LIB): $(OBJ)
  ar -rc $(LIB) $(OBJ)

obj/%.o: src/%.c
  $(CC) $(CFLAGS)  -c $< -o $@

$(DOC): doc/myLib.tex
  cd doc && pdflatex -pdf myLib.tex

clean:
  $(RM) $(OBJ) $(TARGET)
  cd doc && pdflatex -c myLib.tex
```

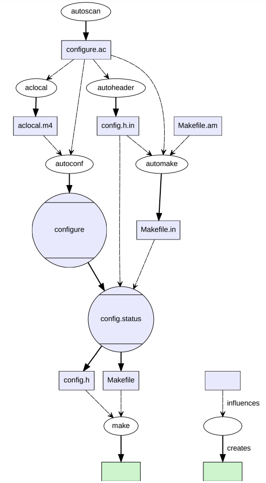
Autotools project

Directory structure

src
A.c
B.c
myExe.c

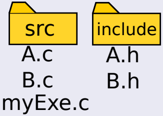
include
A.h
B.h

Autotools



CMake project

Directory structure



src
A.c
B.c
myExe.c

include
A.h
B.h

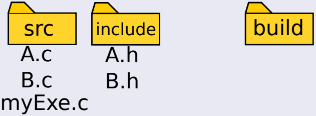
CMakeLists.txt

```
cmake_minimum_required(VERSION 3.0)

project(Test_Project C)

include_directories(include)

add_library(myLib src/A.c src/B.c)

add_executable(myExe src/myExe.c)
target_link_libraries(myExe myLib)
```

CMake commands

CMake project

Directory structure



src
A.c
B.c
myExe.c

include
A.h
B.h

build

CMakeLists.txt

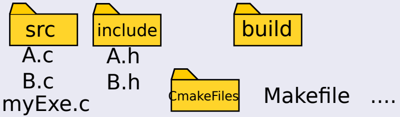
```
cmake_minimum_required(VERSION 3.0)

project(Test_Project C)

include_directories(include)

add_library(myLib src/A.c src/B.c)

add_executable(myExe src/myExe.c)
target_link_libraries(myExe myLib)
```

CMake commands

```
:$ mkdir build
```

CMake project

Directory structure



src
A.c
B.c
myExe.c

include
A.h
B.h

build

CmakeFiles

Makefile ....

CMakeLists.txt

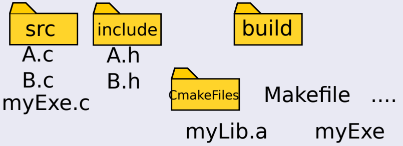
```
cmake_minimum_required(VERSION 3.0)

project(Test_Project C)

include_directories(include)

add_library(myLib src/A.c src/B.c)

add_executable(myExe src/myExe.c)
target_link_libraries(myExe myLib)
```

CMake commands

```
:$ cmake ..
```

CMake project

Directory structure



src
A.c
B.c
myExe.c

include
A.h
B.h

build
CmakeFiles
Makefile ....
myLib.a myExe

CMake commands

:$ make

CMakeLists.txt

```
cmake_minimum_required(VERSION 3.0)

project(Test_Project C)

include_directories(include)

add_library(myLib src/A.c src/B.c)

add_executable(myExe src/myExe.c)
target_link_libraries(myExe myLib)
```

Main Takeaways

Autotools

```
// Typical Autootls compilation
mkdir build && cd build && ../configure && make
// Configuration: From the build directory
../configure –help
```

CMake

```
// Typical CMake compilation
mkdir build && cd build && cmake .. && make
// Configuration: From the build directory
ccmake ..
```