

# Programos kūrimo ciklas ir jo valdymas

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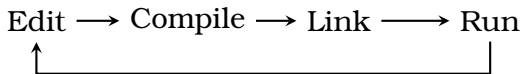


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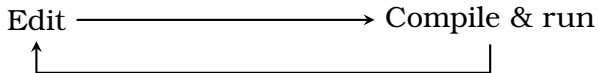


# Programos kūrimo ciklas

- Tipiškas *kompilijuojančios* kalbos programos kūrimo (mikro-)ciklas:



- Tipiškas *interpretuojančios* kalbos programos kūrimo (mikro-)ciklas:



# Edit-Compile-Link-Run ciklas \*x aplinkoje

Kaip visada, viską galima padaryti komandomis

- Paprasta C programa (C++, Ada, Java, Fortran, Pascal, ...)

```
sh> vi main.c
sh> cc main.c -o prog
sh> ./prog arg1 arg2 arg3
```

- Sudėtingesnė C programa

```
sh> vi main.c
sh> cc -c main.c -o main.o
sh> cc -c math.c -o math.o
sh> cc -c libr.c -o libr.o
sh> cc main.o math.o libr.o -o prog -lm
sh> ./prog arg1 arg2 arg3
```

# Edit-Compile&Run ciklas \*x aplinkoje

Be abejo, viskas vykdoma komandomis

- Perl'o, Python'o arba Shell skriptas (C :-), FORTH, Lisp, Haskel, Prolog, ...)

```
sh> vi script
```

```
sh> ./script arg1 arg2 arg3
```

- build.sh:

```
cc -c main.c -o main.o
cc -c math.c -o math.o
cc -c libr.c -o libr.o
cc main.o math.o libr.o -o prog -lm
./prog arg1 arg2 arg3
```

- GNUmakefile, makefile, Makefile:

```
run: prog
———→./prog arg1 arg2 arg3
prog: main.o math.o libr.o
———→cc main.o math.o libr.o -o prog -lm
main.o: main.c
———→cc -c main.c -o main.o
# ... ir dar komandos
# math.o bei libr.o sukurti.
```

- build.sh:

```
set -e
cc -c *.c
cc *.o -o prog -lm
./prog arg1 arg2 arg3
```

- GNUmakefile, makefile, Makefile:

```
run: prog
----->./prog arg1 arg2 arg3
prog: main.o math.o libr.o
----->cc main.o math.o libr.o -o prog -lm
%.o: %.c
----->cc -c $< -o $@
```

- GNUmakefile, makefile, Makefile:

```
run: prog
-----> ./prog arg1 arg2 arg3
prog: main.o math.o libr.o
-----> cc $^ -o $@ -lm
%.o: %.c
-----> cc -c $< -o $@
```

- GNUmakefile, makefile, Makefile:

```
PROGRAM = prog
run: ${PROGRAM}
    ./${PROGRAM} arg1 arg2 arg3
${PROGRAM}: main.o math.o libr.o
    cc $^ -o $@
%.o: %.c
    cc -c $< -o $@
```



- GNUmakefile, makefile, Makefile:

```
PROGRAM = prog
SOURCES = $(wildcard *.c)
OBJECTS = ${SOURCES:%.c=%.o}
run: ${PROGRAM}
    ./${PROGRAM} arg1 arg2 arg3
${PROGRAM}: ${OBJECTS}
    cc $^ -o $@
%.o: %.c
    cc -c $< -o $@
```

# make – pridedame „gerai žinomas tikslus“ (“well known targets”)

- GNUmakefile, makefile, Makefile:

```
PROGRAM = prog
SOURCES = $(wildcard *.c)
OBJECTS = ${SOURCES:%.c=%.o}
all: run
run: ${PROGRAM}
    ./${PROGRAM} arg1 arg2 arg3
${PROGRAM}: ${OBJECTS}
    cc $^ -o $@
%.o: %.c
    cc -c $< -o $@
clean:
    rm -f ${OBJECTS}
cleanAll distclean: clean
    rm -f ${PROGRAM}
```

- GNUmakefile, makefile, Makefile:

```
PROGRAM = prog
SOURCES = $(wildcard *.c)
OBJECTS = ${SOURCES:%.c=%.o}
.PHONY: all run clean cleanAll distclean
all: run
run: ${PROGRAM}
    ./${PROGRAM} ${ARGS}
${PROGRAM}: ${OBJECTS}
    ${CC} ${CFLAGS} $^ -o $@
%.o: %.c
    ${CC} ${CFLAGS} -c $< -o $@
clean:
    rm -f ${OBJECTS}
cleanAll distclean: clean
    rm -f ${PROGRAM}
```

# make – universalus Makefile'as

- GNUmakefile, makefile, Makefile:

```
PROGRAM = $(notdir $(shell pwd))
SOURCES = $(wildcard *.c)
OBJECTS = ${SOURCES:%.c=%.o}
.PHONY: all run clean cleanAll distclean
all: run
run: ${PROGRAM}
    ./${PROGRAM} ${ARGS}
${PROGRAM}: ${OBJECTS}
    ${CC} ${CFLAGS} $^ -o $@
%.o: %.c
    ${CC} ${CFLAGS} -c $< -o $@
clean:
    rm -f ${OBJECTS}
cleanAll distclean: clean
    rm -f ${PROGRAM}
```

- sh> cd ~/projektas/prog  
sh> vi main.c  
sh> vi math.c  
sh> make  
sh> make CFLAGS=-g  
sh> make ARGS="vienas du trys"  
sh> make clean  
sh> make distclean

# Naudingi make parametrai

- `sh> make -n`  
`sh> make -p`  
`sh> make -W libr.c`

- GNU Make – user's manual

*Richard Stallman, Roland McGrath, Paul D. Smith*

<http://www.gnu.org/software/make/>

2009-10-20

- Command line

*Daug autorių, išvardinti tinklalapiuose:*

[http://en.flossmanuals.net/command-line/ch055\\_credits/](http://en.flossmanuals.net/command-line/ch055_credits/)

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<http://en.flossmanuals.net/command-line/>

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