



Makefiles

Make

- ▶ **make**
 - ▶ command used to manage large programs
 - ▶ incremental compile
- ▶ Open URL <http://kernlpanic.com/wp/c-compiler-basics/>
- ▶ **Topics you must understand that we will discuss now**
 - ▶ Simple Compilation
 - ▶ Targets & Dependencies
 - ▶ Dependency Graphs
 - ▶ Timestamps & incremental compile

Rational

- ▶ Download the Eclipse project Rational.tar.gz from CS300Public/2017 on zeus to your Desktop
- ▶ Extract the tarball
- ▶ Import the project into your workspace copying the files
- ▶ Build the project Rational
 - ▶ Run rationalDriver
 - ▶ Run reduceRational

Rational Makefile

```
10 CC = gcc
11 CFLAGS = -g -Wall
12 RATIONAL_OBJECTS = bin/rationalDriver.o bin/rational.o
13 REDUCE_OBJECTS = bin/reduceRational.o bin/rational.o
14 ALL_OBJECTS = ${RATIONAL_OBJECTS} ${REDUCE_OBJECTS}
15
16 .PHONY: all clean valgrind tarball
17
18 all: bin/rationalDriver bin/reduceRational
19
20 bin/rationalDriver: ${RATIONAL_OBJECTS}
21   ${CC} ${CFLAGS} -o bin/rationalDriver ${RATIONAL_OBJECTS}
```

▶ Variables

- ▶ Makefiles can have variables such as **CC** and **CCFLAGS**

▶ Targets

- ▶ By default, Makefile targets are “file targets” used to create other files

▶ .PHONY

- ▶ Declares targets that do not represent physical files
- ▶ target that is always out-of-date, thus, will always run when asked
- ▶ e.g. `make clean`

Rational Makefile

```
35 clean:
36   rm -f bin/rationalDriver  ${ALL_OBJECTS}
37
38 valgrindRational: bin/rationalDriver
39   valgrind -v --leak-check=yes bin/rationalDriver
40
41 tarball: clean
42   tar czf ../puNetIdRational.tar.gz ../Rational
43
```

- ▶ make valgrindRational
- ▶ make tarball

Dependency Graph

- ▶ What does the dependency graph for Rational's Makefile look like?