Arduino Programming Part 1

EAS 199A, Fall 2010, Lecture 5

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Overview

- Discuss details, now that you had a taste
- Arduino Environment
- Basic code components
  - Two required functions: startup() and loop()
  - Variables
  - Calling built-in functions

References

- These notes borrow from
  - Arduino web site
    - http://arduino.cc/en/Guide/Environment
    - http://arduino.cc/en/Tutorial/HomePage
  - Adafruit tutorial #1 and 2
    - http://www.ladyada.net/learn/arduino/lesson2.html
  - Leah Buechley's Introduction to Arduino
    - http://web.media.mit.edu/~leah/LilyPad/03_arduino_intro.html

Basic Process

Design the circuit:

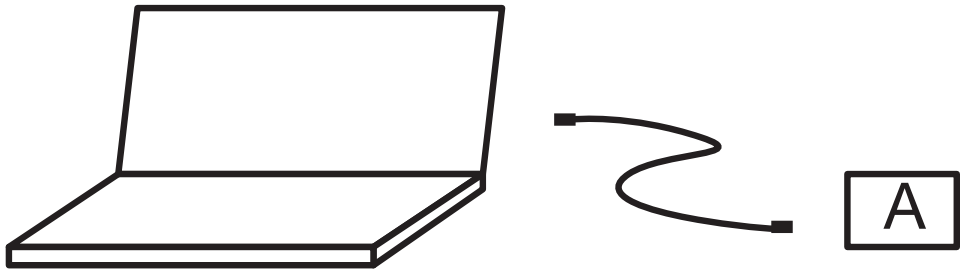
- What are electrical requirements of the sensors or actuators?
- Identify inputs (analog inputs)
- Identify digital outputs

Write the code

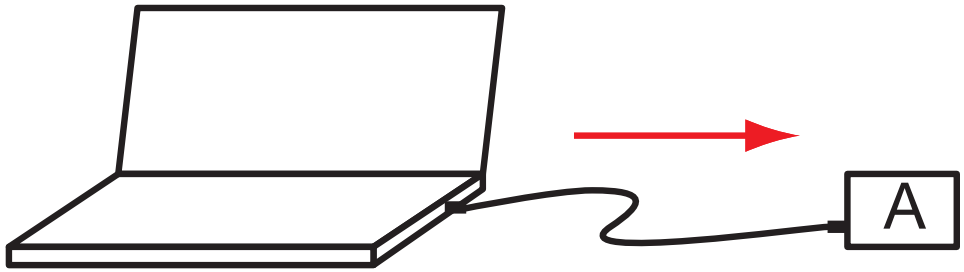
- Build incrementally
  - Get the simplest piece to work first
  - Add complexity and test at each stage
  - Save and Backup frequently
- Use variables, not constants
- Comment liberally

Writing and Downloading Code

Write sketch on PC



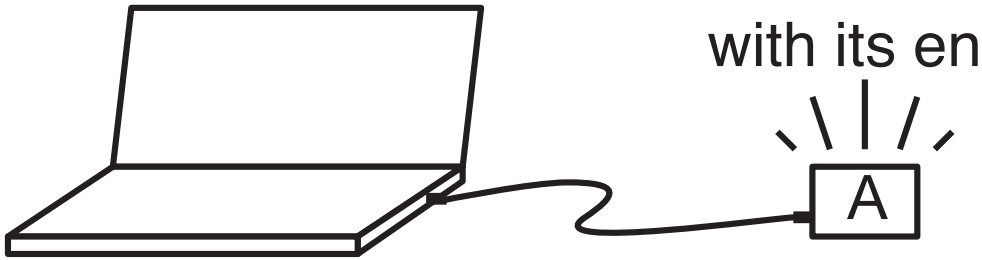
Download sketch to Arduino



Running Code While Tethered

Run sketch on Arduino
and send data back to PC

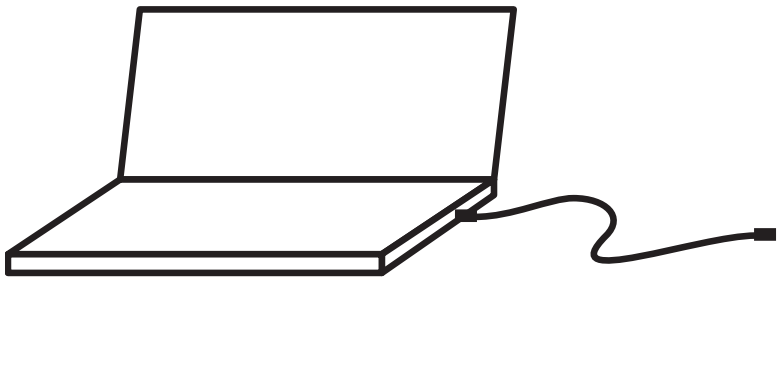
Arduino interacts
with its environment



Serial communication
back to host

Running Code Stand-Alone

Run Arduino in stand alone mode

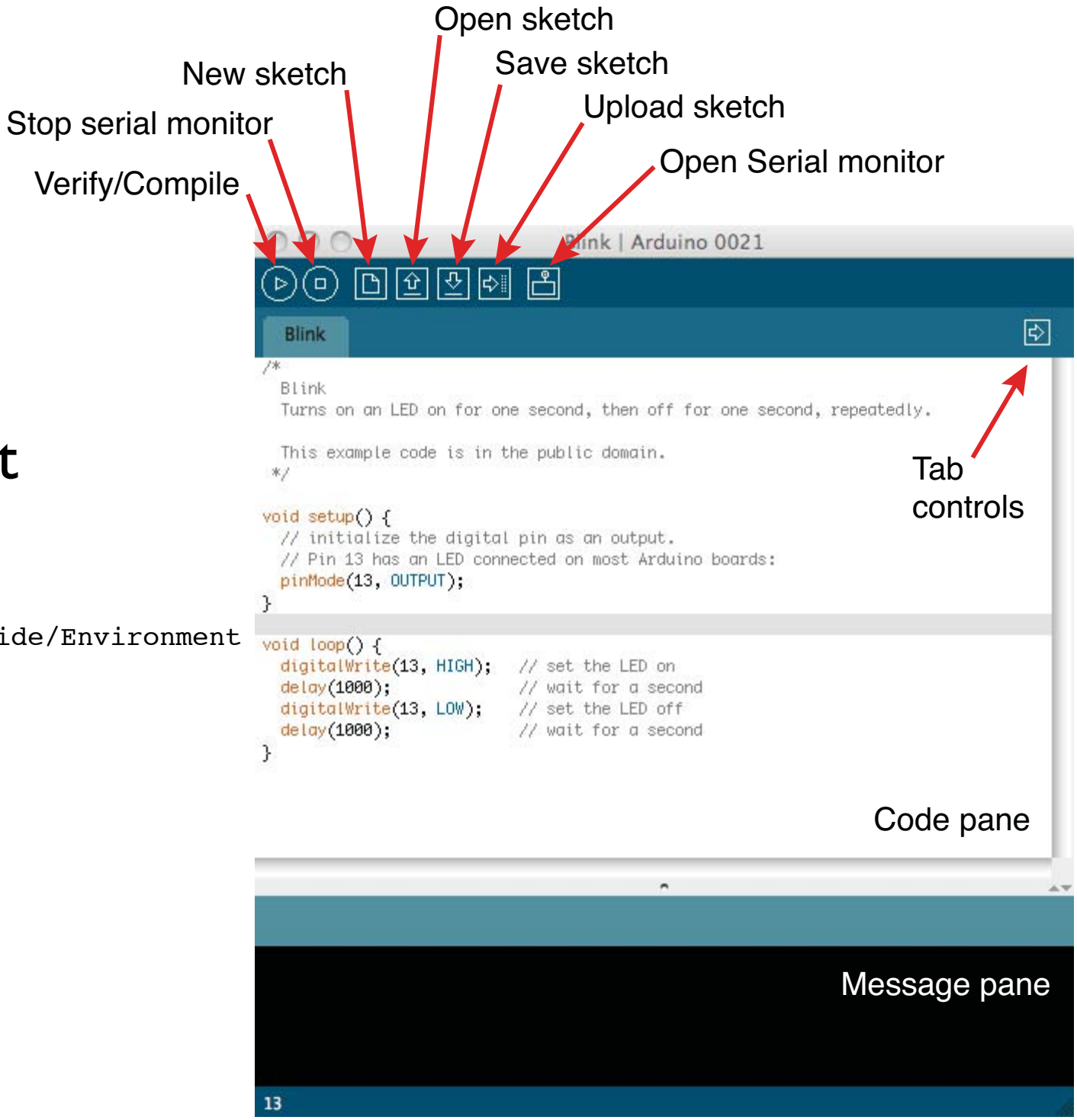


Arduino interacts with its environment and runs on battery power

Arduino IDE

IDE =
Integrated
Development
Environment

http://www.arduino.cc/en/Guide/Environment



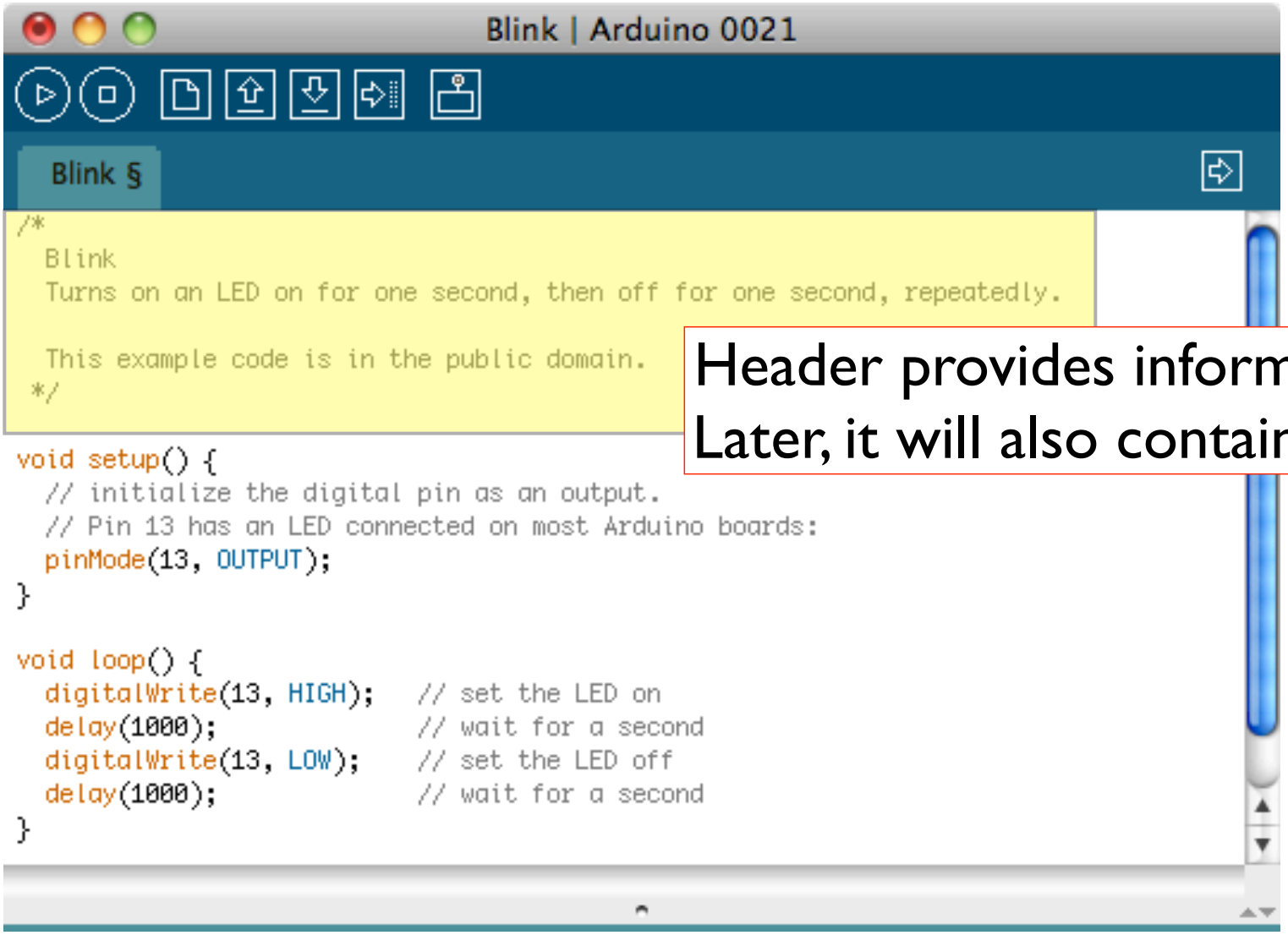
Arduino IDE

http://www.arduino.cc/en/Guide/Environment

Arduino Web Site References

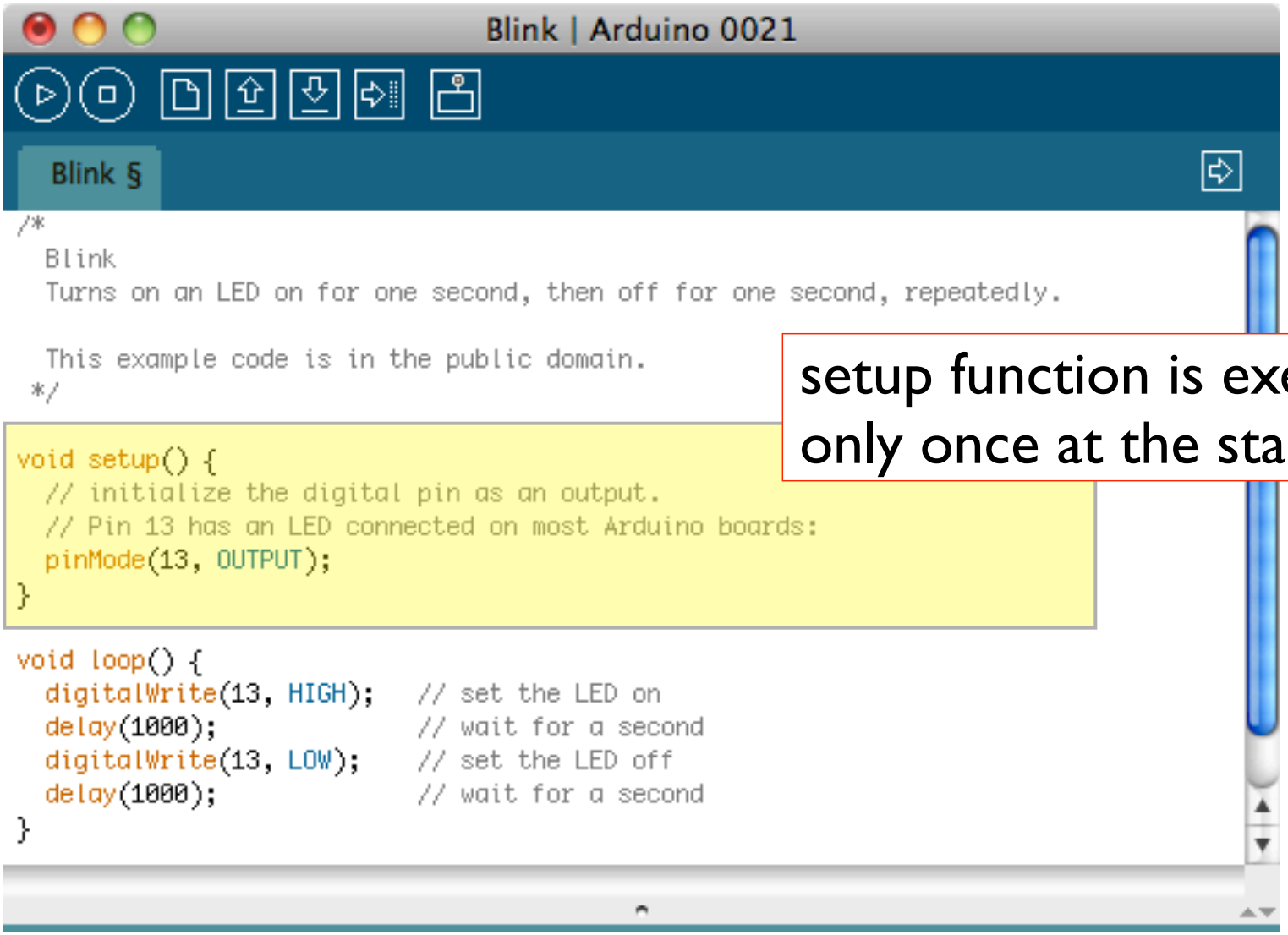
- Overview of the development environment
  - http://www.arduino.cc/en/Guide/Environment
- Language reference
  - http://arduino.cc/en/Reference/HomePage
- Code tutorials
  - http://arduino.cc/en/Tutorial/HomePage

Code Structure: Header



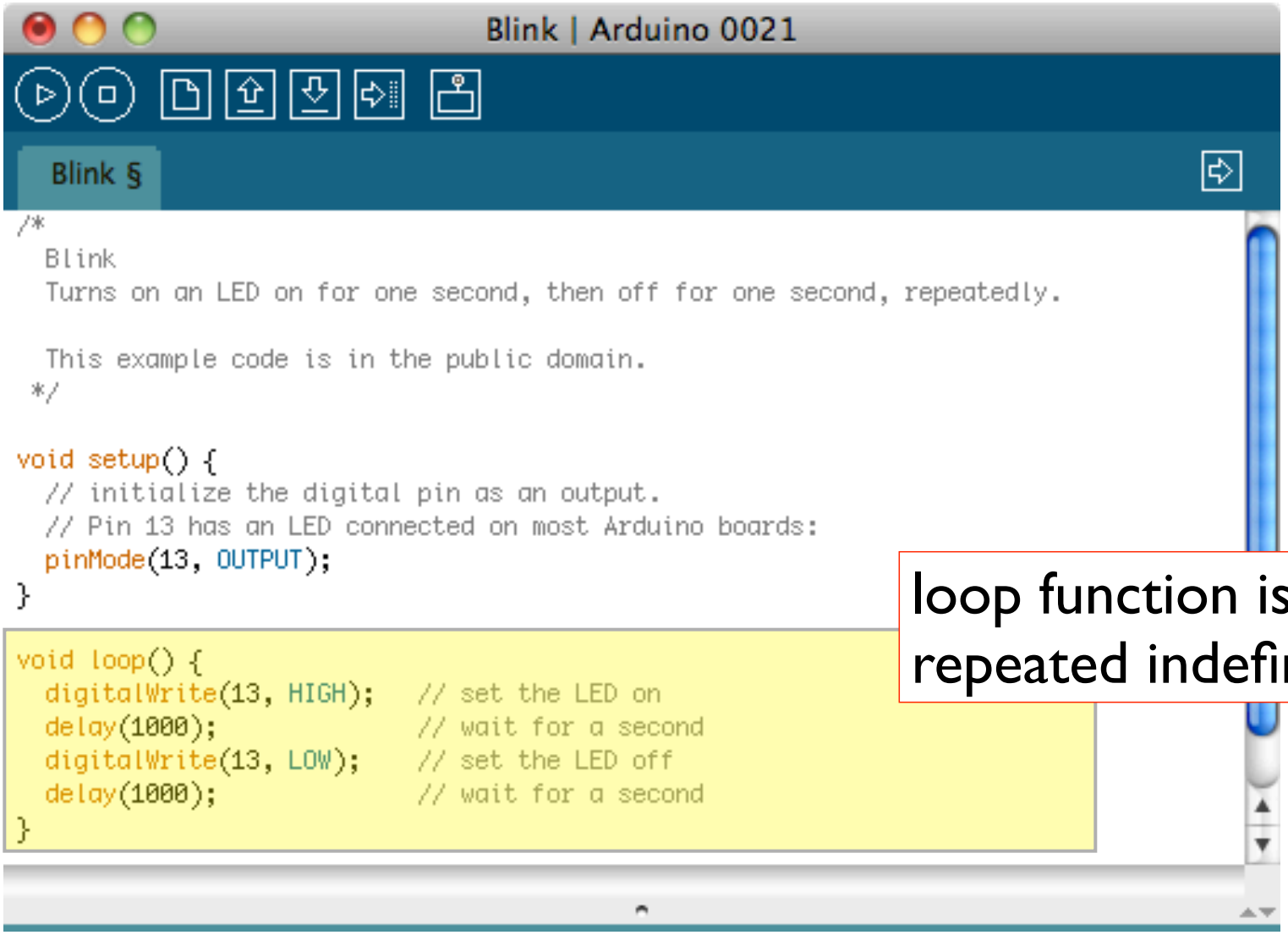
Header provides information.
Later, it will also contain code

Code Structure: setup function



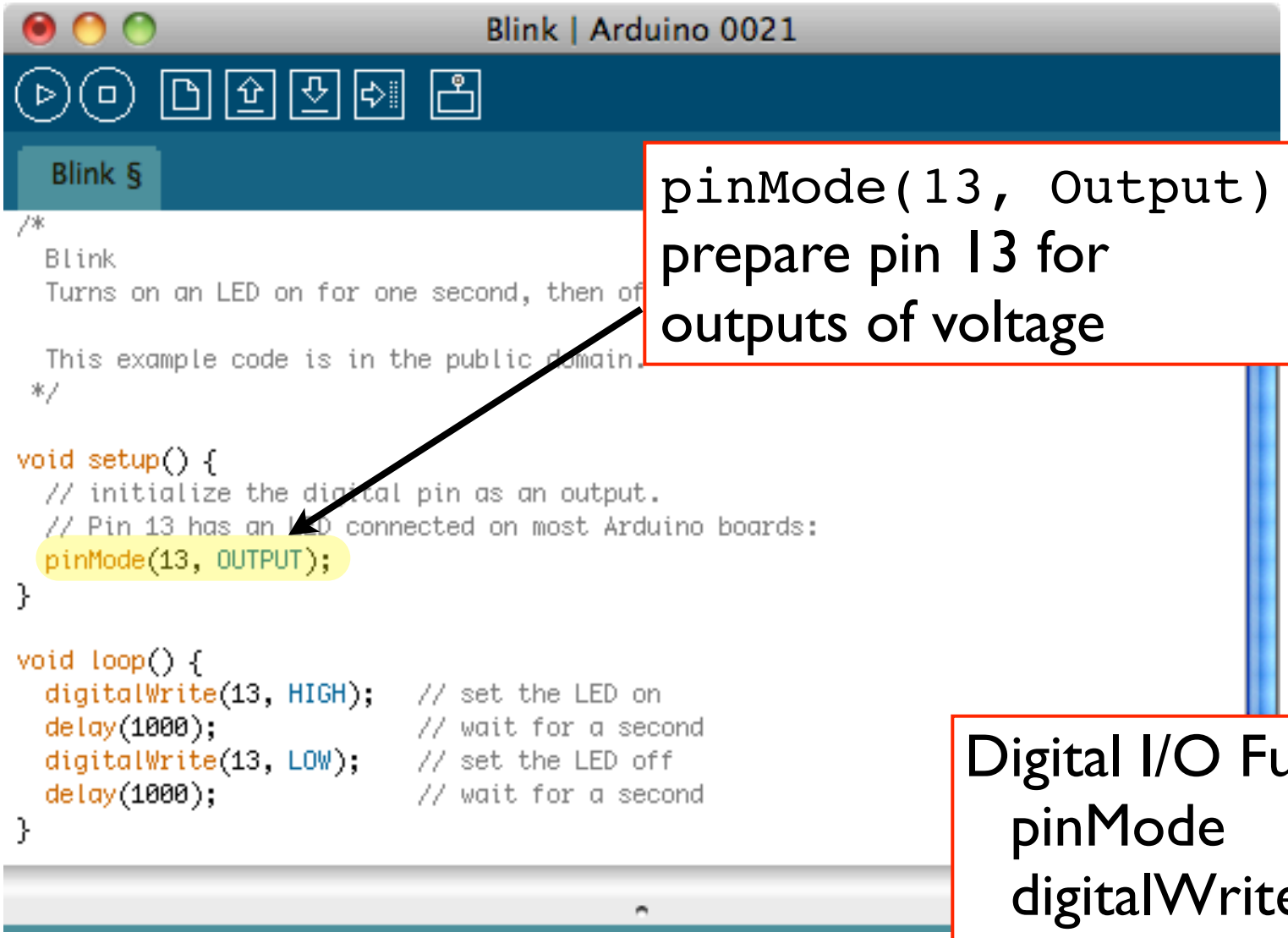
setup function is executed only once at the start

Code Structure: loop function



loop function is repeated indefinitely

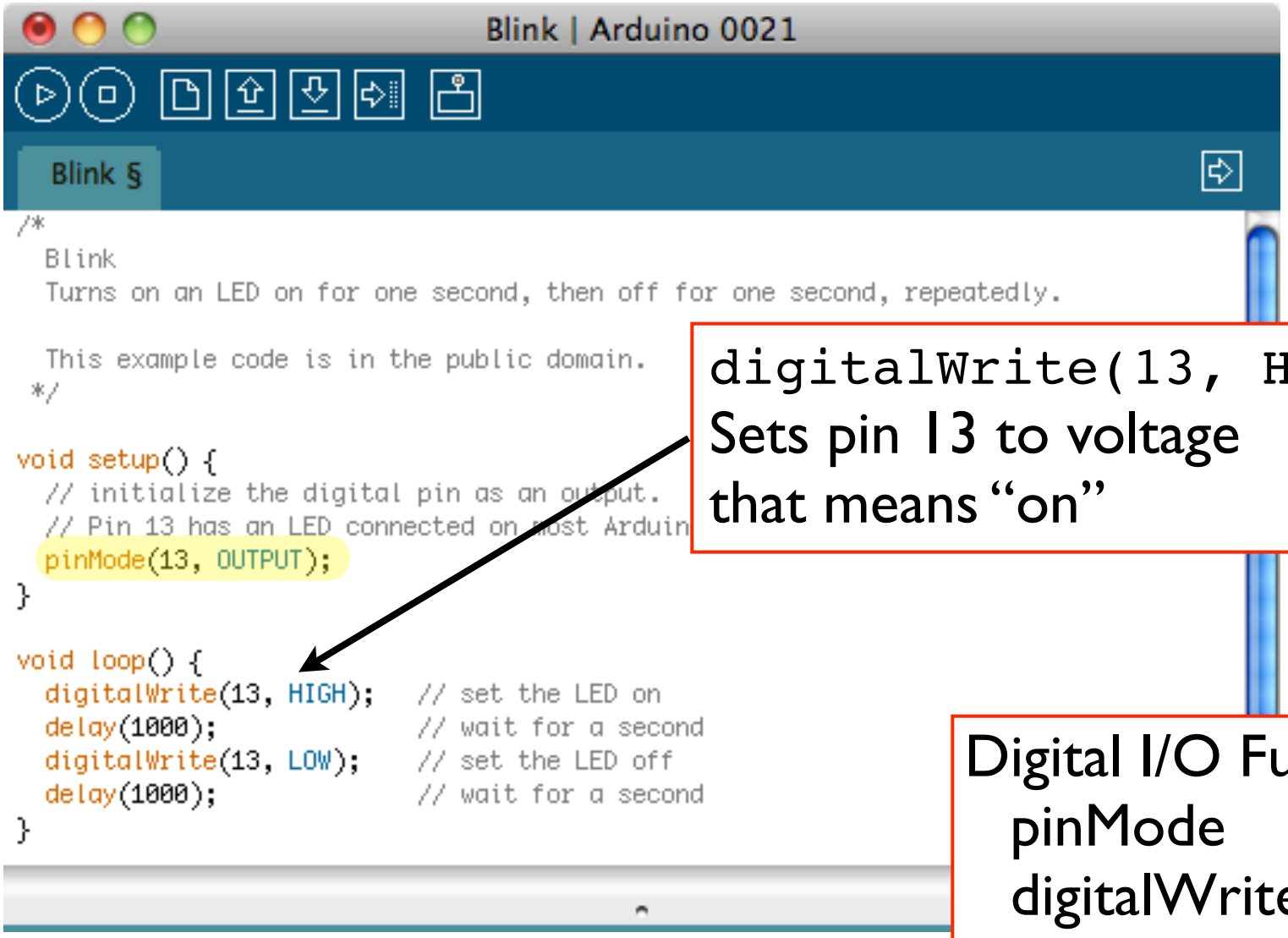
Code



`pinMode(13, Output)`
prepare pin 13 for outputs of voltage

Digital I/O Functions:
- pinMode
- digitalWrite
- digitalRead

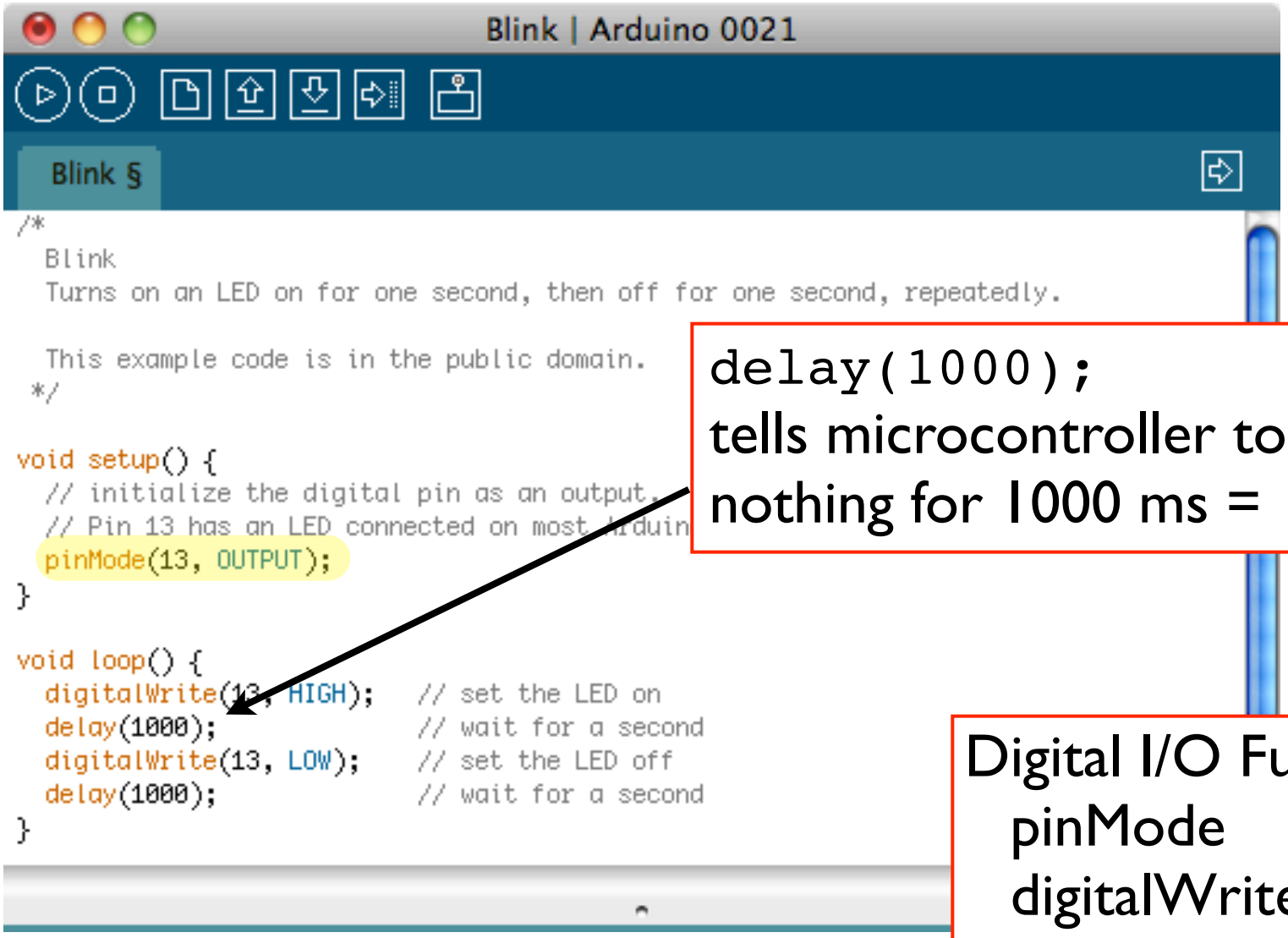
Code



`digitalWrite(13, HIGH)`
Sets pin 13 to voltage that means "on"

Digital I/O Functions:
- pinMode
- digitalWrite
- digitalRead

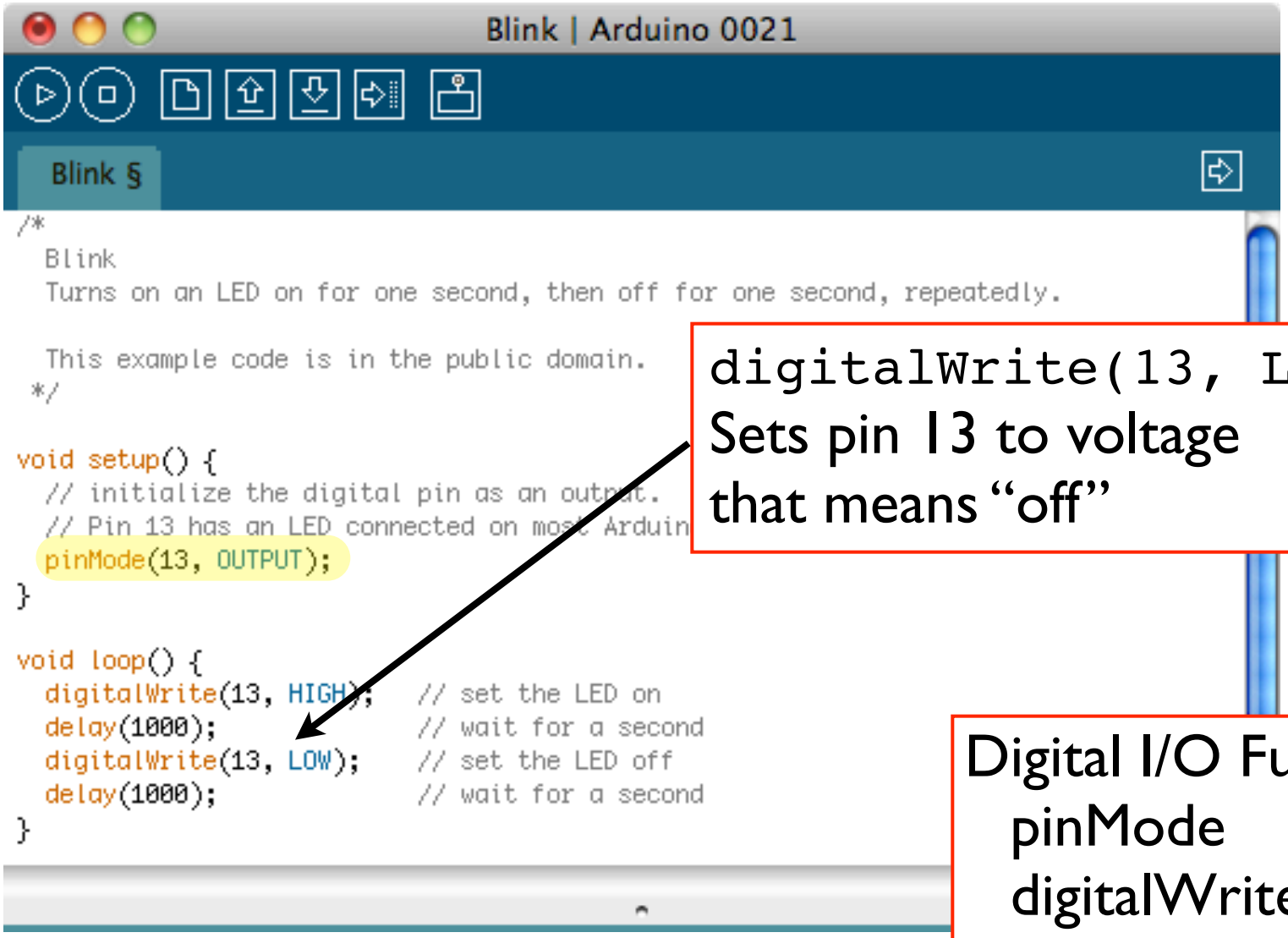
Code



`delay(1000);`
tells microcontroller to do nothing for 1000 ms = 1 s

Digital I/O Functions:
- pinMode
- digitalWrite
- digitalRead

Code



`digitalWrite(13, LOW)`
Sets pin 13 to voltage that means "off"

Digital I/O Functions:
- pinMode
- digitalWrite
- digitalRead

Arduino Variable Types

int	Integer values: 1, 2, 3, -4, 7234
float	Values with non-zero fractional part, 7 digits
double	Currently the same as a float. Normally a double stores values with non-zero fractional part, 15 digits
char	Character values: ‘a’, ‘b’, ‘D’, ‘1’
boolean	True or false values

Using variables and functions

Assigning values: