
Engineering Technology (ENGR 101)

Arduino Programming

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Hello world in Arduino IDE

A function is a block of reusable code that is used to perform an action.

Initializes the speed of the serial port to 9600 baud rate

```
void setup() {
  Serial.begin(9600);
  Serial.println("Hello World!");
}

void loop() {
}
```

prints data to serial bus

- **setup()** function is run first and run only once, every time that the sketch is run.
- **loop()** function will run continuously from top to bottom and then back to the top.

Open Serial Monitor Window

sketch_Hello_World | Arduino 1.8.9

File Edit Sketch Tools Help

```
void setup() {
  // put your setup code here, to run once:
  Serial.begin(9600);
  Serial.println("Hello World");
}

void loop() {
  // put your main code here, to run repeatedly:
}
```

COM4

Send

Hello World

Program Output Text

Baud Rate

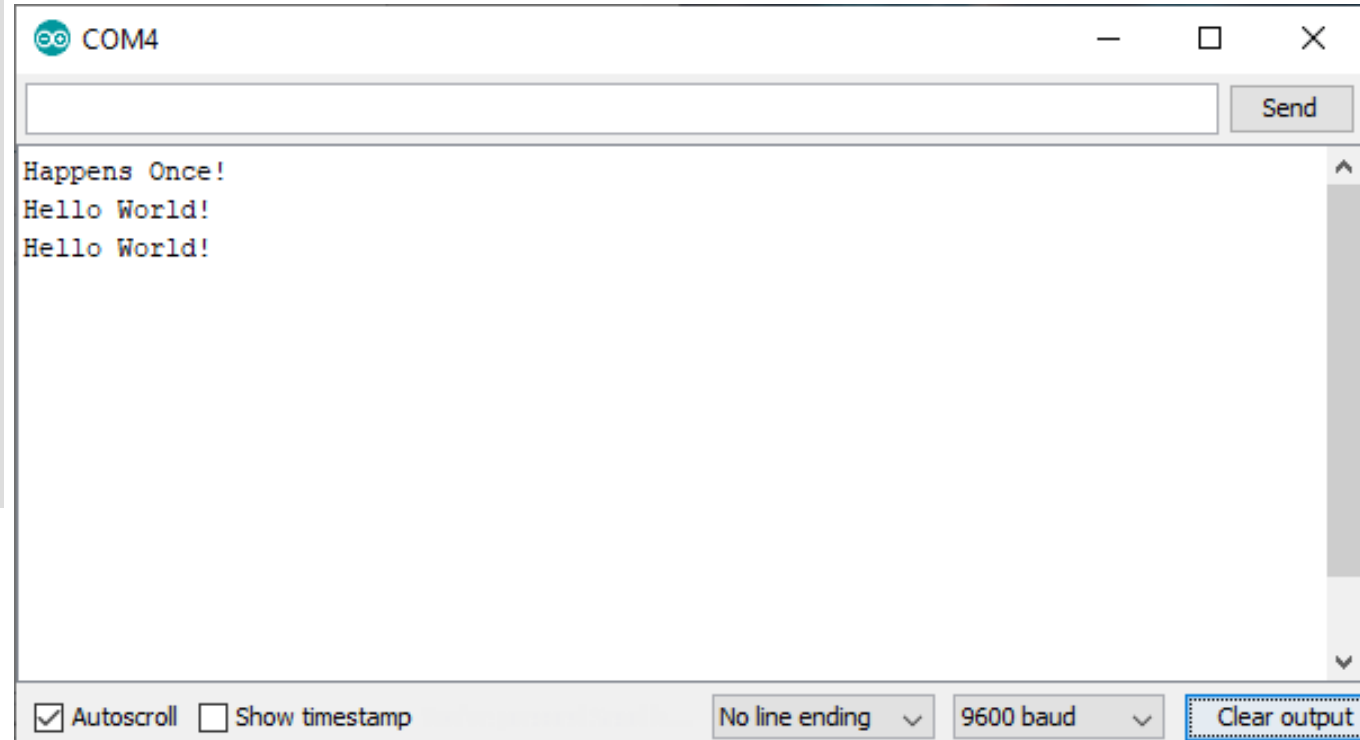
Autoscroll Show timestamp No line ending 9600 baud Clear output

Arduino/Genuino Uno on COM4

Hello world in Arduino IDE

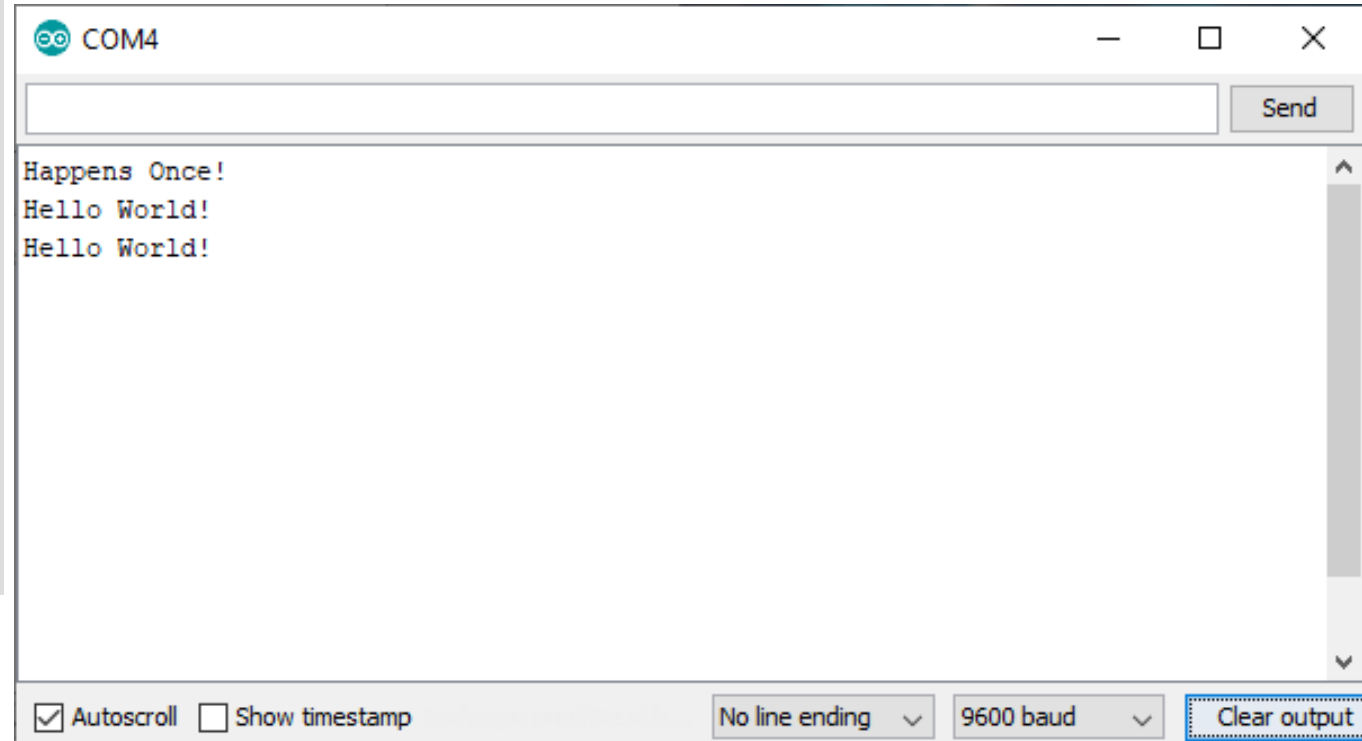
```
void setup() {  
  Serial.begin(9600);  
  Serial.println("Happens Once!");  
  delay(2000);  
}  
void loop() {  
  Serial.println("Hello World!");  
  delay(2000);  
}
```

- **delay(2000)** function causes a waiting period of 2 seconds (2000 milliseconds)



Hello world in Arduino IDE

```
void setup() {  
  Serial.begin(9600);  
  Serial.println("Happens Once!");  
  delay(2000);  
}  
void loop() {  
  Serial.print("Hello ");  
  Serial.println("World!");  
  delay(2000);  
}
```



Writing your own programs

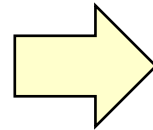
How?

- Use other programs as models, and then modify
 - Very useful strategy
 - Lectures have examples that you can use as models for your assignment programs

A new program

- Change the “Hello world!” program
 - When you upload it to the Arduino, it prints your name to the Arduino Serial Monitor once every second.

```
void setup() {  
  Serial.begin(9600);  
  Serial.println("Happens Once!");  
  delay(2000);  
}  
void loop() {  
  Serial.println("Hello World!");  
  delay(2000);  
}
```



```
void setup() {  
  Serial.begin(9600);  
}  
void loop() {  
  
}
```

Writing your own programs

How?

- Use other programs as models, and then modify
 - Very useful strategy

BUT

- It can be hard to work out how to modify

Need to understand the language

- ⇒ vocabulary
- ⇒ syntax rules
- ⇒ meaning (“semantics”)

Arduino IDE

- There are two special functions that are a part of every Arduino sketch
 - **setup()** is called once, when the sketch starts. It's a good place to do setup tasks like setting pin modes or initializing libraries.
 - **loop()** function is called over and over and is heart of most sketches.
- You need to include both functions in your sketch, even if you don't need them for anything.

Arduino IDE

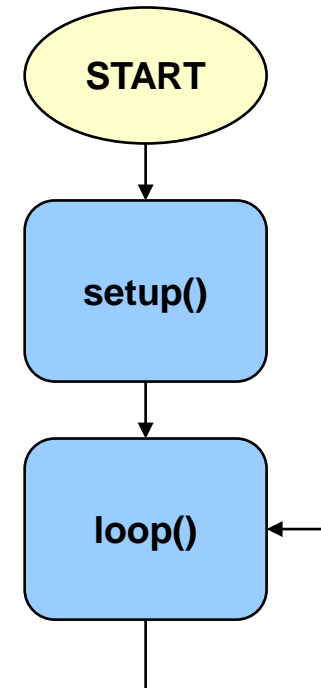
Indicates start of compound statement

```
void setup(){  
    // runs once
```

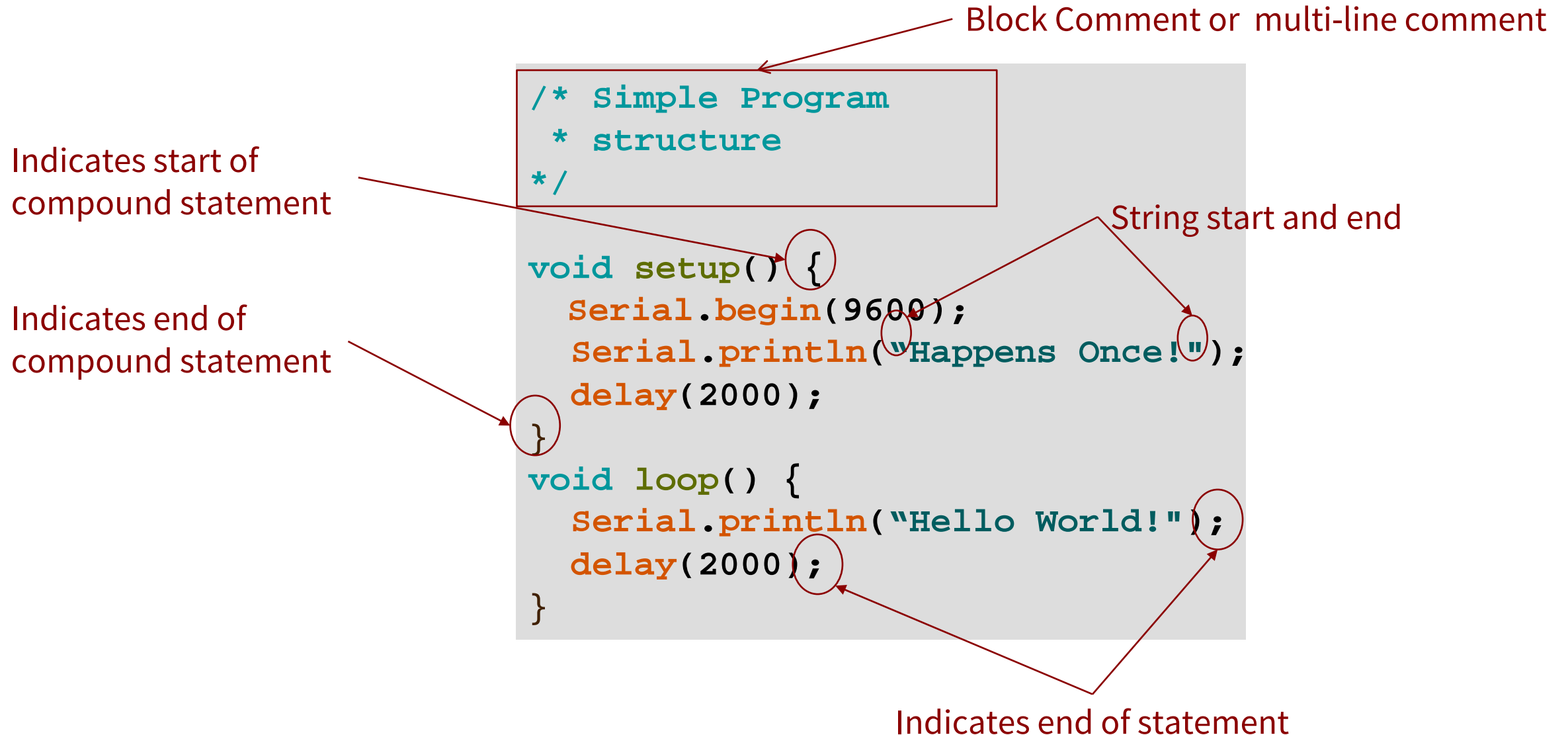
Indicates end of compound statement

```
}  
  
void loop(){  
    // repeats  
}
```

Single line comment



Program structure



Comments

```
/* Comment text */
```

- Compiler ignores everything from `/*` to `*/`

```
// Comment text
```

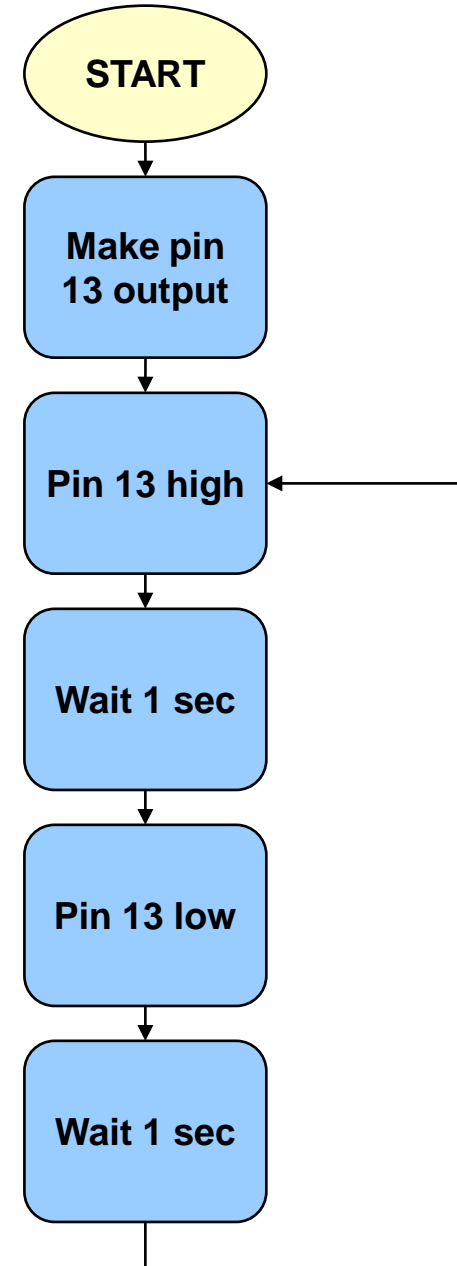
- Compiler ignores everything from `//` to the end of the line
- This commenting style originated from C++ and was adopted by C (C99 standard)

Arduino IDE

```
void setup() {  
  pinMode(13, OUTPUT);  
}  
void loop() {  
  digitalWrite(13, HIGH);  
  delay(1000);  
  digitalWrite(13, LOW);  
  delay(1000);  
}
```

Indicates end of statement

C is **case-sensitive!**

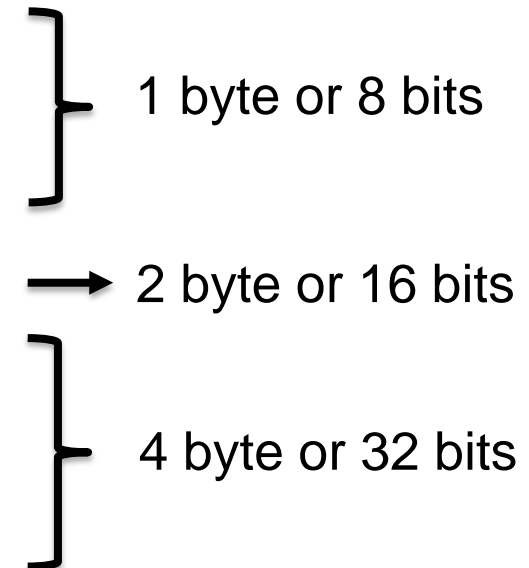


Variables and Variable Types

- You can use variables in a similar way as they are used in math or physics
- All variables must be *declared* before they are used, and optionally,
- set an initial value (*initialising the variable*).
- <https://www.arduino.cc/reference/en/#variables>

- **Variable Types:**

- **bool**, holds one of two values, *true* or *false*
- **byte**, holds a number from 0 to 255
- **char**, holds one character value
- **int**, in Arduino Uno holds a number from -32,768 to 32,767
- **long**, holds a number from -2,147,483,648 to 2,147,483,647
- **float**, for floating-point numbers.
- **double**, for floating-point numbers.



Arduino IDE

```
void setup() {  
    pinMode(13, OUTPUT);  
}  
void loop() {  
    digitalWrite(13, HIGH);  
    delay(1000);  
    digitalWrite(13, LOW);  
    delay(1000);  
}
```

```
int led = 13;  
void setup() {  
    pinMode(led, OUTPUT);  
}  
void loop() {  
    digitalWrite(led, HIGH);  
    delay(1000);  
    digitalWrite(led, LOW);  
    delay(1000);  
}
```

