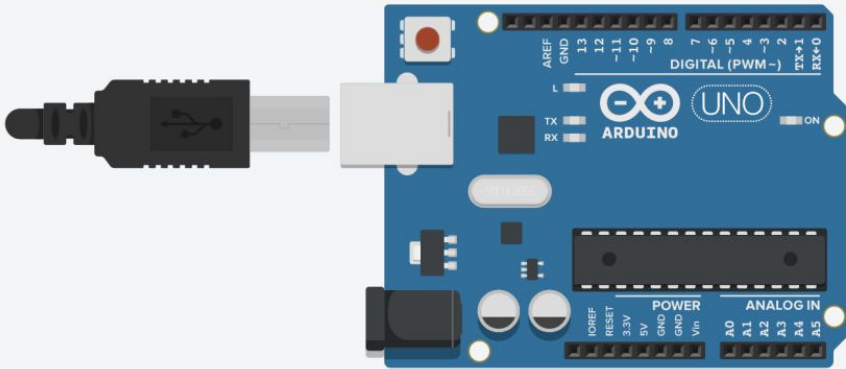


Atividade Prática 5

Welbert Almeida

Parte 1 – Print Arduino



The screenshot displays the Tinkercad web interface. On the left, a 3D model of an Arduino Uno R3 board is shown with a USB Type-C cable connected to its micro-USB port. The board features a USB Type-C connector, a USB Type-A connector, a DC power jack, a reset button, and various digital and analog pins. The text "ARDUINO UNO" is visible on the board.

On the right, the code editor shows the following C++ code:

```
1 // C++ code
2 //
3
4 long c;
5 int i, j;
6 long inicio, fim, tempo;
7
8 void setup()
9 {
10   Serial.begin(9600);
11 }
12
13 void loop()
14 {
15   i = 1;
16   j = 3;
17
18   inicio = micros();
19   for(c = 0; c < 1000000; c = c+1)
20   {
21     i = i + 3;
22   }
23
24   fim = micros();
25   tempo = (fim - inicio);
26   Serial.print("tempo = ");
27   Serial.println(tempo);
28 }
29
```

Below the code editor, the Serial Monitor window is open, displaying the output of the program:

```
tempo = 2715296
tempo = 2715548
tempo = 2715548
tempo = 2525856
tempo = 2526108
tempo = 2526108
tempo = 2841872
```

Parte 1 – Tabela Arduino

		i = i op 3			i = i op j		
Tipo	Tempo Base	Soma	Or	Mult	Soma	Or	Mult
Byte	tempo = 2462956	tempo = 2525856	tempo = 2399808	tempo = 2652400	tempo = 2652396	tempo = 2841836	tempo = 2841836
Int	tempo = 2715292	tempo= 3473284	tempo = 2589004	tempo = 3031276	tempo = 3094424	tempo = 3220468	tempo = 3599592
Float	tempo = 3220712	tempo = 12437600	N/A	tempo = 10356164	tempo = 12690432	N/A	tempo = 10609000
* Int	tempo = 2715296	tempo= 4231044	tempo= 3473284	tempo= 4357336	tempo= 4862512	tempo = 3788788	tempo= 5367676

Parte 1 – Tabela Arduino

MIPS (ATM328P)

	Constante			Variável		
Tipo	Soma	Or	Mult	Soma	Or	Mult
Byte	~15.898251 MIPS	~15.835814 MIPS	~5.278605 MIPS	~5.278716 MIPS	~2.639358 MIPS	~2.639358 MIPS
Int	~7.917656 MIPS	~7.918409 MIPS	~3.164717 MIPS	~2.637604 MIPS	~1.979508 MIPS	~1.130838 MIPS
* Int	~7.902390 MIPS	~7.917907 MIPS	~3.164677 MIPS	~0.465714 MIPS	~0.931539 MIPS	~0.377019 MIPS

Parte 1 – Tabela Arduino

MFLOPS (ATM328P)

Constante

Variável

Tipo	Soma	Or	Mult	Soma	Or	Mult
Float	~0.108496 MFLOPS	N/A	~0.140145 MFLOPS	~0.105600 MFLOPS	N/A	~0.135349 MFLOPS

Parte 1 – Tabela Arduino

CPI						
	Constante			Variável		
Tipo	Soma	Or	Mult	Soma	Or	Mult
Byte	39.407296	40.413696	42.4384	42.438336	45.469376	45.469376
Int	45.465472	41.424064	48.500416	49.510784	51.527488	57.593472
Float	199.0016	N/A	165.698624	203.046912	N/A	169.744
* Int	45.46944	45.465472	48.500544	69.717376	60.620608	85.882816

Parte 2 – PassMark Benchmark

```
File Edit View Terminal Tabs Help
PassMark PerformanceTest Linux

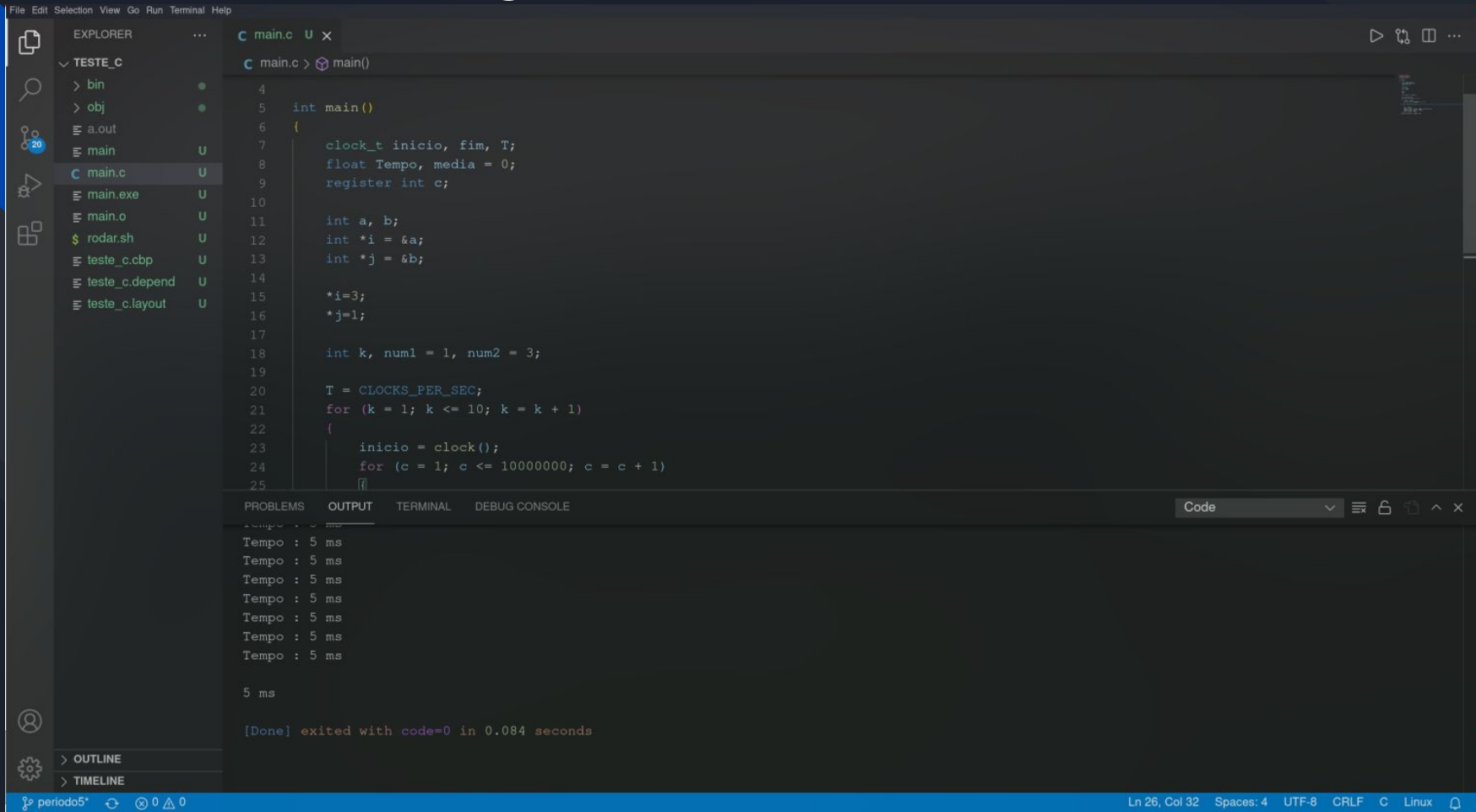
AMD Ryzen 5 5600X 6-Core Processor (x86_64)
6 cores @ 4932 MHz | 31.3 GiB RAM
Number of Processes: 12 | Test Iterations: 1 | Test Duration: Medium
-----
CPU Mark:                22942
Integer Math              69505 Million Operations/s
Floating Point Math       39196 Million Operations/s
Prime Numbers             123 Million Primes/s
Sorting                   32771 Thousand Strings/s
Encryption                17812 MB/s
Compression               261 MB/s
CPU Single Threaded       3400 Million Operations/s
Physics                   1734 Frames/s
Extended Instructions (SSE) 15003 Million Matrices/s

Memory Mark:              3025
Database Operations       6073 Thousand Operations/s
Memory Read Cached        34662 MB/s
Memory Read Uncached      22217 MB/s
Memory Write              14624 MB/s
Available RAM             24948 Megabytes
Memory Latency            51 Nanoseconds
Memory Threaded           35628 MB/s
-----

Results submitted: https://www.passmark.com/baselines/V10/display.php?id=500694756009

Use ESC or CTRL-C to exit
A: Run All Tests   C: Run CPU Tests   M: Run Memory Tests   U: Upload Test Results
```

Parte 3 – Print Código em C



The screenshot shows the Visual Studio Code interface with a C program named `main.c` open. The Explorer sidebar on the left shows the project structure, including a folder named `TESTE_C` and files like `bin`, `obj`, `a.out`, `main`, `main.exe`, `main.o`, `rodar.sh`, `teste_c.cbp`, `teste_c.depend`, and `teste_c.layout`. The main editor displays the C code for `main.c`, which includes a `main()` function. The code uses `clock_t` for timing, declares variables `a`, `b`, `i`, `j`, `k`, `num1`, and `num2`, and contains a loop that runs 10 times. The output window at the bottom shows the execution results, including the timing of each iteration and the final exit status.

```
4
5 int main()
6 {
7     clock_t inicio, fim, T;
8     float Tempo, media = 0;
9     register int c;
10
11     int a, b;
12     int *i = &a;
13     int *j = &b;
14
15     *i=3;
16     *j=1;
17
18     int k, num1 = 1, num2 = 3;
19
20     T = CLOCKS_PER_SEC;
21     for (k = 1; k <= 10; k = k + 1)
22     {
23         inicio = clock();
24         for (c = 1; c <= 10000000; c = c + 1)
25         {
```

Tempo : 5 ms
Tempo : 5 ms
Tempo : 5 ms
Tempo : 5 ms
Tempo : 5 ms
Tempo : 5 ms
Tempo : 5 ms
Tempo : 5 ms
5 ms
[Done] exited with code=0 in 0.084 seconds

Ln 26, Col 32 Spaces: 4 UTF-8 CRLF C Linux

Parte 3 – Configuração do PC

Ryzen 5 5600X - 6 cores / 12 threads @4.6 Ghz

32 GB RAM @ 3200 Mhz

Arch Linux - kernel versão 5.14.14

GCC E GCC-libs versão 11.1.0

Parte 3 – Tabela Programa C

		i = i op 3			i = i op j		
Tipo	Tempo Base	Soma	Or	Mult	Soma	Or	Mult
Byte	2.2 ms	16 ms	2.7 ms	18 ms	17 ms	6.4 ms	19 ms
Int	2.6 ms	3 ms	6.2 ms	4 ms	3.1 ms	8.1 ms	6.4 ms
Float	3.2 ms	27.8 ms	N/A	26 ms	44.6 ms	N/A	43 ms
* Int	2.2 ms	3.5 ms	2.3 ms	5.6 ms	5 ms	10.6 ms	8.2 ms

Parte 3 – Tabela Programa C

MIPS (Meu PC)						
	Constante			Variável		
Tipo	Soma	Or	Mult	Soma	Or	Mult
Byte	~72463.768116 MIPS	2000000 MIPS	~63291.139241 MIPS	~67567.567568 MIPS	~238095.238095 MIPS	~59523.809524 MIPS
Int	2500000 MIPS	~277777.777778 MIPS	~714285.714286 MIPS	2000000 MIPS	~181818.181818 MIPS	~263157.894737 MIPS
* Int	~769230.769231 MIPS	10000000 MIPS	~294117.647059 MIPS	~357142.857143 MIPS	~119047.619048 MIPS	~166666.666667

Parte 3 – Tabela Programa C

MFLOPS (Meu PC)						
	Constante			Variável		
Tipo	Soma	Or	Mult	Soma	Or	Mult
Float	~40650.406504 MIPS	N/A	~43859.649123 MIPS	~24154.589372 MIPS	N/A	~25125.628141 MIPS

Parte 3 – Tabela Programa C

CPI						
	Constante			Variável		
Tipo	Soma	Or	Mult	Soma	Or	Mult
Byte	7.68	1.296	8.64	8.16	3.072	9.12
Int	1.44	2.976	1.92	1.488	3.888	3.072
Float	13.344	N/A	12.4	21.408	N/A	20.64
* Int	1.68	1.104	2.688	2.4	5.088	3.936