

# Questão 1

Etapas de execução do programa:



# 1. Iniciando a execução do programa

The screenshot displays the Keil uVision IDE interface. The main window shows the assembly code for 'questao1.c'. The code includes a delay function, an interrupt service routine 'acionarPedido()', and a main function. The registers window on the left shows the current state of the registers, with 'PC' at 0x008F. The command window at the bottom shows the command 'Load "C:\Keil\_v5\CS1\Maquina\_de\_cafe\Lab8051\Objects\questao1"', indicating the program is being loaded. On the right side, there are three hardware configuration windows for Parallel Port 1, Parallel Port 2, and Parallel Port 3. Each window shows the port number, the data bus (P1, P2, P3) set to 0xFF, and the pins (Pins) set to 0xFF.

**Registers Window:**

Register	Value
r0	0x00
r1	0x00
r2	0x00
r3	0x00
r4	0x00
r5	0x00
r6	0x00
r7	0x00
Sys	0x00
a	0x00
b	0x00
sp_max	0x07
dptr	0x0000
PC	0x008F
states	389
sec	0.00019450
psw	0x00

**Assembly Code (questao1.c):**

```
34: int main() {
35:     P1=0;
36:     P2=0;
37:     EA=1;
38:     EX0=1;
39:     while(1) {
40:     }
41: }
42:
43:
44: void delay(ms){
45:     int i;
46:     for (i=0;i<ms;i++){
47:     }
48: }
49:
50: void acionarPedido() interrupt 0{
51:     if ((Cha == 1) && (Cafe == 0)) {
52:         PresencaDeCopo = 1;
53:         delay(5000);
54:         DerramandoLiquido = 1;
55:         delay(5000);
56:         DerramandoLiquido = 0;
57:         PresencaDeCopo = 0;
58:         Cha = 0;
59:     } else if ((Cha == 0) && (Cafe == 1)) {
60:         PresencaDeCopo = 1;
61:         delay(5000);
62:         DerramandoLiquido = 1;
63:         delay(5000);
64:         DerramandoLiquido = 0;
65:         PresencaDeCopo = 0;
66:         Cafe = 0;
67:     }
68: }
69:
70: int main() {
71:     P1=0;
72:     P2=0;
73:     EA=1;
74:     EX0=1;
75:     while(1) {
76:     }
77: }
```

**Hardware Configuration:**

- Parallel Port 1:** Port 1, P1: 0xFF, Pins: 0xFF
- Parallel Port 2:** Port 2, P2: 0xFF, Pins: 0xFF
- Parallel Port 3:** Port 3, P3: 0xFF, Pins: 0xFF

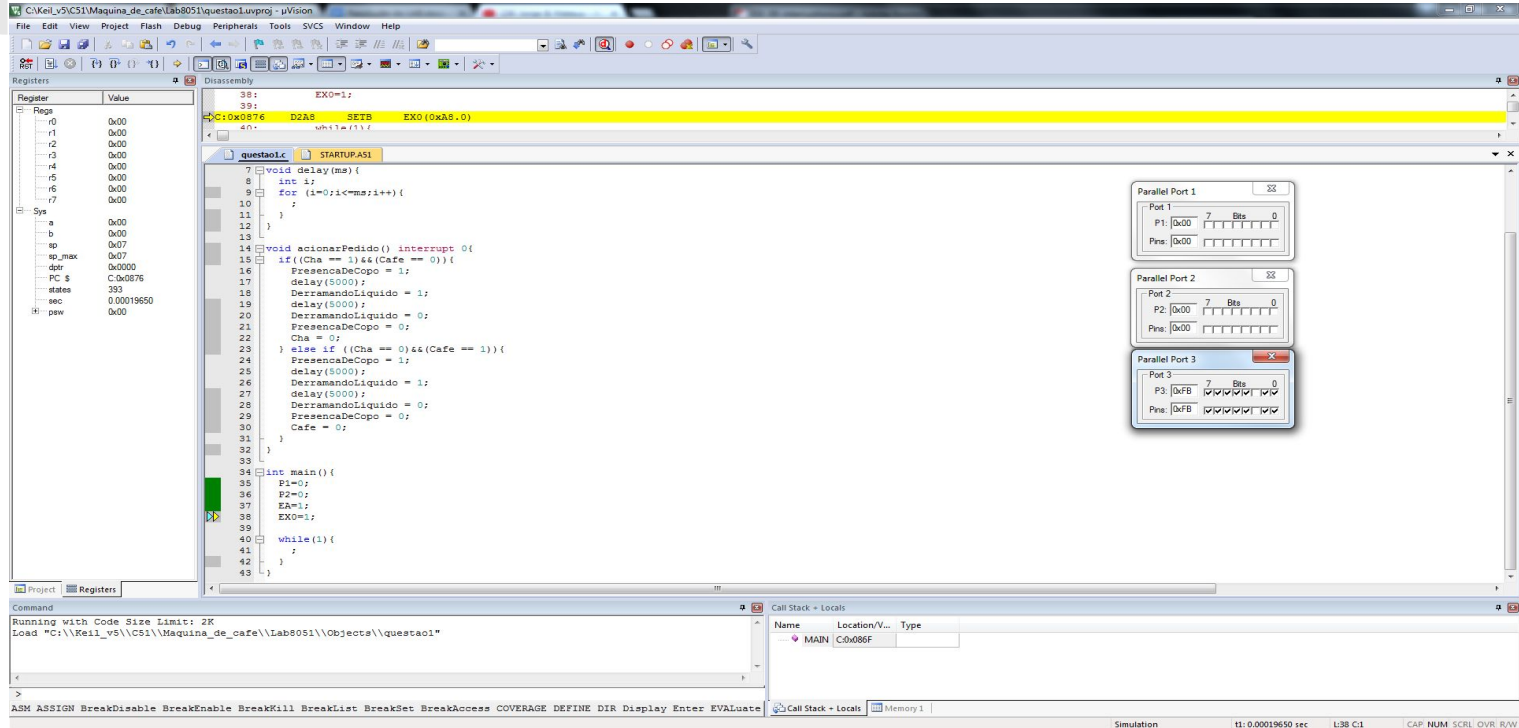
**Command Window:**

```
Running with Code Size Limit: 2K
Load "C:\Keil_v5\CS1\Maquina_de_cafe\Lab8051\Objects\questao1"
```

**Call Stack + Locals:**

Name	Location/V...	Type
MAIN	C:0x08F	

1. No começo da execução, as portas P2 e P1, recebem valor 0 (zero), e a porta P3.2 (interrupção externa) é acionada.



### 3. Caso, a porta P3.2 seja acionada, o usuário pode escolher se quer chá (P2.0) ou café (P2.1).

The screenshot displays the Keil uVision IDE interface for a project named 'Maquina\_de\_cafe'. The main window shows the assembly code for the 'questao1' target, with the following code highlighted in yellow:

```
15: if ((Cha == 1) && (Cafe == 0)) {  
16: C:0x0811 30A00E JNB P2_0(0xA0.0), C:0822  
17: C:0x0814 20A10B JB P2_1(0xA0.1), C:0822  
18: ;  
19: PresencaDeCopo = 1;  
20: }
```

Below the assembly code, the C code for the same target is shown:

```
3 #define Cafe P2_1  
4 #define PresencaDeCopo P1_0  
5 #define DerramandoLiquido P1_1  
6  
7 void delay(ms) {  
8     int i;  
9     for (i=0; i<ms; i++) {  
10         ;  
11     }  
12 }  
13  
14 void acionarPedido() interrupt 0 {  
15     if ((Cha == 1) && (Cafe == 0)) {  
16         PresencaDeCopo = 1;  
17         delay(5000);  
18         DerramandoLiquido = 1;  
19         DerramandoLiquido = 0;  
20         PresencaDeCopo = 0;  
21         Cha = 0;  
22     } else if ((Cha == 0) && (Cafe == 1)) {  
23         PresencaDeCopo = 1;  
24         delay(5000);  
25         DerramandoLiquido = 1;  
26         DerramandoLiquido = 0;  
27         PresencaDeCopo = 0;  
28         Cafe = 0;  
29     }  
30 }  
31  
32  
33  
34 int main() {  
35     P1=0;  
36     P2=0;  
37     EA=1;  
38     EX0=1;  
39 }
```

The registers window on the left shows the current state of the registers, with the PC register at 0x0811. The command window at the bottom shows the simulation status: 'Running with Code Size Limit: 2K' and 'Load "C:\\Keil\_v5\\CS1\\Maquina\_de\_cafe\\Lab8051\\Objects\\questao1"'. The call stack window on the right shows the current call stack with the following entries:

Name	Location/V...	Type
ACL	C:0x0800	
MAIN	C:0x086F	

The Parallel Port 1, 2, and 3 windows on the right show the current state of the ports. Parallel Port 1 has P1\_0 at 0x00 and P1\_1 at 0x00. Parallel Port 2 has P2\_0 at 0x01 and P2\_1 at 0x01. Parallel Port 3 has P3\_0 at 0xFB, P3\_1 at 0xFB, P3\_2 at 0xFB, and P3\_3 at 0xFB.

## 4. Quando uma das portas P2.0 ou P2.1 for acionada, a porta P1.0 será acionada para sinalizar que existe um copo.

The screenshot displays the Keil uVision IDE with the following components:

- Registers:** A window on the left showing the state of various registers. The PC register is highlighted at 0x0084B.
- Assembly Window:** The central window showing the assembly of the C code. The code defines constants for coffee machine status (Cha F2\_0, Cafe P2\_1, PresencaDeCopo P1\_0, DerramandoLiquido P1\_1) and implements a delay function and an interrupt service routine (ISR) for P2.0 and P2.1. The ISR sets P1.0 when coffee is present or P1.1 when liquid is spilled.
- Parallel Port 1:** A status window showing Port 1 (P1) with a value of 0x01. The P1 pin is also shown as 0x01.
- Parallel Port 2:** A status window showing Port 2 (P2) with a value of 0x01. The P2 pin is also shown as 0x01.
- Parallel Port 3:** A status window showing Port 3 (P3) with a value of 0xFB. The P3 pin is also shown as 0xFB.
- Command Window:** At the bottom, it shows the command to load the program: "Load 'C:\\Keil\_v5\\CS1\\Maquina\_de\_cafe\\Lab8051\\Objects\\questao1'".
- Call Stack - Locals:** A window on the right showing the call stack and local variables. It includes variables like DEL, m, i, and L100.

The status bar at the bottom indicates the simulation is running at 11:0.00021350 sec, with L1:0 C:1 and CAP: NUM SCRL OVR: R/W.

## 5. Em seguida, a porta P1.1 será acionada para sinalizar que o líquido está sendo derramado.

The screenshot displays the Keil uVision IDE with the following components:

- Registers:** A table showing the current state of registers. For example, R0 is 0x33, R1 is 0x00, and R2 is 0x00.
- Disassembly:** A window showing the assembly code generated from the C source. The current instruction is `CLR P1_1(0x90.1)` at address 20.
- Command:** A window showing the command `Running with Code Size Limit: 2K` and the load path `Load "C:\\Keil_v5\\CS1\\Maquina_de_cafe\\Lab8051\\Objects\\questao1"`.
- Call Stack - Locals:** A window showing the current function call stack, with `MAIN` at location `C0x086F`.
- Parallel Port 1:** A window showing the state of Port 1, with P1.1 set to 0.
- Parallel Port 2:** A window showing the state of Port 2, with P2.0 set to 0.
- Parallel Port 3:** A window showing the state of Port 3, with P3.0 set to 0.

```
20: DerramandoLiquido = 0;
21: CLR P1_1(0x90.1)
22: PresencaDeCopo = 0;
23: Cha = 0;
24: while(1){
25:     if((Cha == 1) && (Cafe == 0)){
26:         PresencaDeCopo = 1;
27:         delay(5000);
28:         DerramandoLiquido = 1;
29:         delay(5000);
30:         DerramandoLiquido = 0;
31:         PresencaDeCopo = 0;
32:         Cha = 0;
33:     } else if ((Cha == 0) && (Cafe == 1)){
34:         PresencaDeCopo = 1;
35:         delay(5000);
36:         DerramandoLiquido = 1;
37:         delay(5000);
38:         DerramandoLiquido = 0;
39:         PresencaDeCopo = 0;
40:         Cafe = 0;
41:     }
42: }
```

## 6. Quando o copo estiver cheio, a porta P1.1 será desativada.

The screenshot displays the Keil uVision IDE interface. The main window shows the assembly code for a project named 'questao1'. The code is written in assembly language and includes comments in Portuguese. The code is as follows:

```
21: PresencaDeCopo = 0;
22: CLR P1_0(0x90.0)
23: Cha = 0;
24: CLR C290 CTR B2 0(0x20.0)

.questao1.c STARTUP.A51
7: void delay(ms){
8:   int i;
9:   for (i=0;i<ms;i++){
10:    ;
11:   }
12: }
13:
14: void acionarPedido() interrupt 0{
15:   if ((Cha == 1) && (Cafe == 0)){
16:     PresencaDeCopo = 1;
17:     delay(5000);
18:     DerramandoLiquido = 1;
19:     delay(5000);
20:     DerramandoLiquido = 0;
21:     PresencaDeCopo = 0;
22:     Cha = 0;
23:   } else if ((Cha == 0) && (Cafe == 1)){
24:     PresencaDeCopo = 1;
25:     delay(5000);
26:     DerramandoLiquido = 1;
27:     delay(5000);
28:     DerramandoLiquido = 0;
29:     PresencaDeCopo = 0;
30:     Cafe = 0;
31:   }
32: }
33:
34: int main() {
35:   P1=0;
36:   P2=0;
37:   EA=1;
38:   EX0=1;
39:   while(1){
40:     ;
41:   }
42: }
43: }
```

The Registers window on the left shows the state of the registers. The PC register is at 0x081C, and the SP register is at 0x0000. The Command window at the bottom shows the command 'Load "C:\\Keil\_v5\\CS1\\Maquina\_de\_cafe\\Lab8051\\Objecta\\questao1"', indicating the loading of the object file for the assembly.

On the right side, there are three hardware simulation windows for Parallel Port 1, Parallel Port 2, and Parallel Port 3. Each window shows the port number, the data value, and the pins. The data values are 0x01 for all three ports, and the pins are 0x01 for all three ports.

The Call Stack window at the bottom right shows the current call stack, with the main function at the top, located at 0x081A, and the assembly function at 0x086F.

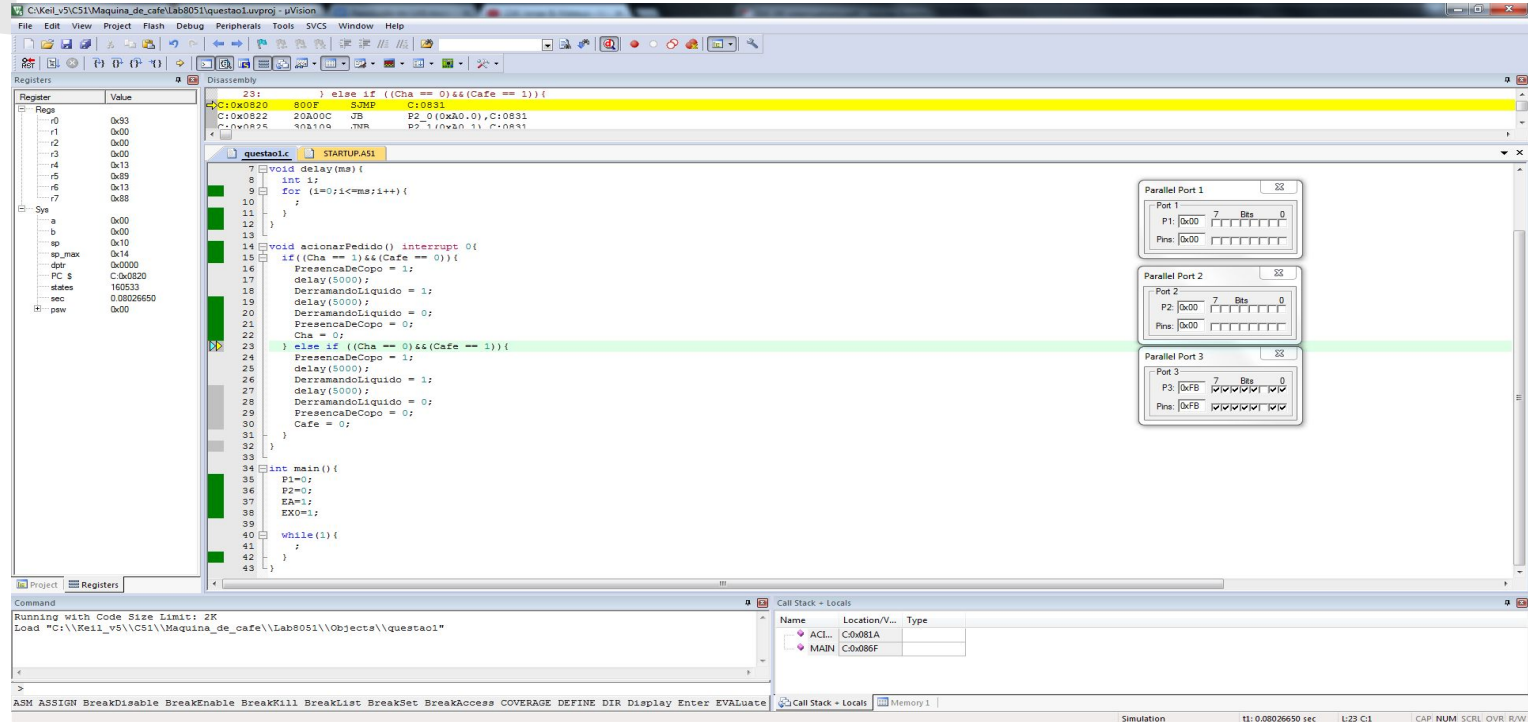
## 7. Logo em seguida, a porta P1.0 será desativada para sinalizar que não tem mais copo.

The screenshot displays the Keil uVision IDE interface with the following components:

- Registers:** A table showing the current state of registers. The PC register is at 0x000E, and the SP register is at 0x0010.
- Assembly:** The assembly window shows the instruction `CLR P2_0 (0x00.0)` at address 23, which corresponds to the line `Cha = 0;` in the C code.
- C Code:** The C code window shows the implementation of the `questao1.c` file. It includes a `delay` function, an interrupt service routine `acionarPedido`, and a `main` function that initializes pins and enters a while loop.
- I/O Pin Configurations:** Three diagrams on the right show the configuration of Parallel Ports 1, 2, and 3. Port 1 has P1.0 configured as an output. Port 2 has P2.0 configured as an output. Port 3 has P3.0 configured as an output.
- Command Window:** The command window shows the execution of the `Load` command, indicating that the code is being loaded into the target device.
- Call Stack - Locals:** The call stack window shows the current function being executed, `main`, and its location in memory.



## 8. Por fim, a porta P2.0 ou P2.1 será desativada.



The screenshot displays the Keil uVision IDE interface. The main window shows the assembly code for a project named "questao1.uvproj". The code is in assembly language, with comments in Portuguese. The code defines a delay function, an interrupt function, and a main function. The main function initializes P1, P2, EA, and EX0, and then enters a while loop. The code is running in simulation mode, and the registers window shows the current state of the registers. The command window shows the load command and the simulation status.

**Registers:**

Register	Value
R0	0x33
R1	0x00
R2	0x00
R3	0x00
R4	0x13
R5	0x09
R6	0x13
R7	0x88
Sys	0x00
a	0x00
b	0x00
sp	0x10
sp_max	0x14
dptr	0x0000
PC	0x0820
status	160533
sec	0.08026550
paw	0x00

**Assembly Code:**

```
231 } else if ((Cha == 0) && (Cafe == 1)) {  
232     C:0x0820 800F SJMP C:0831  
233     C:0x0822 20A00C JB P2_0(0xA0.0),C:0831  
234     C:0x0825 90A10A JNB P2_1(0xA0.1),C:0831  
235 }  
236  
237 void delay(ms){  
238     int i;  
239     for (i=0;i<ms;i++){  
240         ;  
241     }  
242 }  
243  
244 void acionarFedido() interrupt 0{  
245     if ((Cha == 1) && (Cafe == 0)) {  
246         PresencaDeCopo = 1;  
247         delay(5000);  
248         DerramandoLiquido = 1;  
249         delay(5000);  
250         DerramandoLiquido = 0;  
251         PresencaDeCopo = 0;  
252         Cha = 0;  
253     } else if ((Cha == 0) && (Cafe == 1)) {  
254         PresencaDeCopo = 1;  
255         delay(5000);  
256         DerramandoLiquido = 1;  
257         delay(5000);  
258         DerramandoLiquido = 0;  
259         PresencaDeCopo = 0;  
260         Cafe = 0;  
261     }  
262 }  
263  
264 int main(){  
265     P1=0;  
266     P2=0;  
267     EA=1;  
268     EX0=1;  
269  
270     while(1){  
271         ;  
272     }  
273 }
```

**Parallel Port 1:**

Port 1	7 Bits	0
P1	0x00	
Pins	0x00	

**Parallel Port 2:**

Port 2	7 Bits	0
P2	0x00	
Pins	0x00	

**Parallel Port 3:**

Port 3	7 Bits	0
P3	0xFB	
Pins	0xFB	

**Command Window:**

```
Running with Code Size Limit: 2K  
Load "C:\Keil_v5\CS1\Maquina_de_cafe\Lab8051\Objects\questao1"  
  
>
```

**Call Stack - Locals:**

Name	Location/V...	Type
ACL	C0x081A	
MAIN	C0x086F	

**Simulation Status:**

Simulation T1: 0.08026650 sec L23 C1 CAP: NUM SCRL OVR: R/W