Valeo India Private Limited

BASIC Q

Q. What is ISR?

An ISR(Interrupt Service Routine) is an interrupt handler, a callback subroutine which is called when a interrupt is encountered.

Q. What is return type of ISR?

ISR does not return anything. An ISR returns nothing because there is no caller in the code to read the returned values.

Q. What is interrupt latency?

Interrupt latency is the time required for an ISR responds to an interrupt.

Q. How to reduce interrupt latency?

Interrupt latency can be minimized by writing short ISR routine and by not delaying interrupts for more time.

Q.What are inline functions?

The ARM compilers support inline functions with the keyword __inline. These functions have a small definition and the function body is substituted in each call to the inline function. The argument passing and stack maintenance is skipped and it results in faster code execution, but it increases code size, particularly if the inline function is large or one inline function is used often.

Q.What are the uses of the keyword static?

Static keyword can be used with variables as well as functions. A variable declared static will be of static storage class and within a function, it maintains its value between calls to that function. A variable declared as static within a file, scope of that variable will be within that file, but it can't be accessed by other files.

Functions declared static within a module can be accessed by other functions within that module. That is, the scope of the function is localized to the module within which it is declared.

Q. What are the uses of the keyword volatile?

Volatile keyword is used to prevent compiler to optimize a variable which can change unexpectedly beyond compiler's comprehension. If we declare a variable volatile, compiler will not cache it in its register.

Q. What is semaphore?

Semaphore is actually a variable or abstract data type which controls access to a common resource by multiple processes. Semaphores are of two types -

- Binary semaphore – It can have only two values (0 and 1). The semaphore value is set to 1 by the process in charge, when the resource is available.
- Counting semaphore – It can have value greater than one. It is used to control access to a pool of resources.

Q. **What is difference between binary semaphore and mutex?**

The differences between binary semaphore and mutex are as follows -

- Mutual exclusion and synchronization can be used by binary semaphore while mutex is used only for mutual exclusion.
- A mutex can be released by the same thread which acquired it. Semaphore values can be changed by other thread also.
- From an ISR, a mutex can not be used.
- The advantage of semaphores is that, they can be used to synchronize two unrelated processes trying to access the same resource.
- Semaphores can act as mutex, but the opposite is not possible.

Q. What is spin lock?

If a resource is locked, a thread that wants to access that resource may repetitively check whether the resource is available. During that time, the thread may loop and check the resource without doing any useful work. Suck a lock is termed as spin lock.

Q. **What is virtual memory?**

Virtual memory is a technique that allows processes to allocate memory in case of physical memory shortage using automatic storage allocation upon a request. The advantage of the virtual memory is that the program can have a larger memory than the physical memory. It allows large virtual memory to be provided when only a smaller physical memory is available. Virtual memory can be implemented using paging.

A paging system is quite similar to a paging system with swapping. When we want to execute a process, we swap it into memory. Here we use a lazy swapper called pager rather than swapping the entire process into memory. When a process is to be swapped in, the pager guesses which pages will be used based on some algorithm, before the process is swapped out again. Instead of swapping whole process, the pager brings only the necessary pages into memory. By that way, it avoids reading in unnecessary memory pages, decreasing the swap time and the amount of physical memory.

Q. Advantages and disadvantages of using macro and inline functions?

The advantage of the macro and inline function is that the overhead for argument passing and stuff is reduced as the function are in-lined.

The advantage of macro function is that we can write type insensitive functions. It is also the disadvantage of macro function as macro functions can't do validation check.

The macro and inline function also increases the size of the executable.

Q. Significance of watchdog timer in Embedded Systems.

The watchdog timer is a timing device with a predefined time interval. During that interval, some event may occur or else the device generates a time out signal. It is used to reset to the original state whenever some inappropriate events take place which can result in system malfunction. It is usually operated by counter devices.

Q. Data Alignment & Structure Padding

Data Alignment: Data alignment means putting the data at a memory offset equal to some multiple of the word size, which increases the system's performance due to the way the CPU handles memory

Data Structure Padding: To align the data, it may be necessary to insert some meaningless bytes between the end of the last data structure and the start of the next, which is data structure padding

----------> **1** <----------

1. What you know about embedded system.?

In my answer I mentioned 8051..so next questian on 8051.

Ans:-

An embedded system is some combination of computer hardware and software.

2. What all things you have done with 8051?

I started with with lcd interfacing..(its your wish where to start) he asked me to draw and explain..

3. Explain i2c and spi protoclos

I2C and SPI are both bus protocols that allow short-distance, serial data transfer. I2C originates from the Philips semiconductor devision, while SPI was created by Motorola

SPI	**I2C**
->SPI can only work with one master device controlling multiple slaves	-> I2C allows multiple masters and slaves on the bus.
->SPI protocol is inherently full-duplex	->The I2C protocol is inherently half-duplex

->In both I2C and SPI the master device controls the clock for all slaves, but an I2C slave device can modify the main bus clock.

USART, for Universal Synchronous/Asynchronous Receiver Transmitter. This can do UART, but also a synchronous protocol. In synchronous there's not only data, but also a clock transmitted. With each bit a clock pulse tells the receiver it should latch that bit. Synchronous protocols either need a higher bandwidth, like in the case of Manchester encoding, or an extra wire for the clock, like SPI and I2C.

SPI (Serial Peripheral Interface) is another very simple serial protocol. A master sends a clock signal, and upon each clock pulse it shifts one bit out to the slave, and one bit in, coming from the slave. Signal names are therefore SCK for clock, MOSI for Master Out Slave In, and MISO for Master In Slave Out. By using SS (Slave Select) signals the master can control more than 1 slave on the bus. There are two ways to connect multiple slave devices to one master, one is mentioned above i.e. using slave select, and other is daisy chaining, it uses less hardware pins(select lines), but software gets complicated.

I2C (Inter-Integrated Circuit, pronounced "I squared C") is also a synchronous protocol, and it's the first we see which has some "intelligence" in it; the other ones dumbly shifted bits in and out, and that was that. I2C uses only 2 wires, one for the clock (SCL) and one for the data (SDA). That means that master and slave send data over the same wire, again controlled by the master who creates the clock signal.

4. Given a table containing 4 columns.

1st column- values in A register

2nd - values in B register

3rd- operator(+ - / *)

4th- result(we have to fill this column- keep in mind the range of an 8 bit register.. confirm with him whether it is signed or unsigned)

5. Difference between analogue and digital signals

	Analog	Digital
Signal	Analog signal is a continuous signal which represents physical measurements.	Digital signals are discrete time signals generated by digital modulation.
Waves	Denoted by sine waves	Denoted by square waves
Example	Human voice in air, analog electronic devices.	Computers, CDs, DVDs, and other digital electronic devices.
Flexibility	Analog hardware is not flexible.	Digital hardware is flexible in implementation.
Uses	Can be used in analog devices only. Best suited for audio and video transmission.	Best suited for Computing and digital electronics.
Applications	Thermometer	PCs, PDAs
Memory	Stored in the form of wave signal	Stored in the form of binary bit
Power	Analog instrument draws large power	Digital instrument drawS only negligible power
Cost	Low cost and portable	Cost is high and not easily portable
Impedance	Low	High order of 100 megaohm
Errors	Analog instruments usually have a scale which is cramped at lower end and give considerable observational errors.	Digital instruments are free from observational errors like parallax and approximation errors.

6. **What is duty cycle..? Draw square wave with 30% duty cycle..**

Duty Cycle

When the signal is high, we call this “on time”. To describe the amount of “on time” , we use the concept of duty cycle. Duty cycle is measured in percentage. The percentage duty cycle specifically describes the percentage of time a digital signal is on over an interval or period of time. This period is the inverse of the frequency of the waveform.

Thats all.. prepare well on 8051.. expect "explain" questians..

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In technical round interviewer asked me about basic definitions , then he told me to write programs.

1.To find specific pattern in an array

```
#include <stdio.h>
#include <string.h>

int match(char [], char []);

int main() {
  char a[100], b[100];
  int position;

  printf("Enter some text\n");
  gets(a);

  printf("Enter a string to find\n");
  gets(b);

  position = match(a, b);

  if(position != -1) {
    printf("Found at location %d\n", position + 1);
  }
  else {
    printf("Not found.\n");
  }

  return 0;
}

int match(char text[], char pattern[]) {
  int c, d, e, text_length, pattern_length, position = -1;

  text_length    = strlen(text);
  pattern_length = strlen(pattern);

  if (pattern_length > text_length) {
    return -1;
  }

  for (c = 0; c <= text_length - pattern_length; c++) {
    position = e = c;

    for (d = 0; d < pattern_length; d++) {
      if (pattern[d] == text[e]) {
        e++;
      }
      else {
        break;
      }
```

```
    }
    if (d == pattern_length) {
      return position;
    }
  }

  return -1;
}
```

2.To sort elements of an array

```
#include<stdio.h>
int main()
{
        int temp,size,array[100],i,j;
        printf("enter the req. no.of  array elements...\n");
        scanf("%d",&size);

        for(i=0;i<size;i++)
                scanf("%d",&array[i]);

        printf("before sorting.....\n");
        for(i=0;i<size;i++)
                printf("%d ",array[i]);

        for(i=0;i<size;i++)
        {
                for(j=i+1;j<size;j++)
                {
                        if(array[j]<array[i])
                        {
                                temp = array[i];
                                array[i] = array[j];
                                array[j] =temp;
                        }
                }
        }

        printf("\nafter sorting ....\n");
```

```
    for(i=0;i<size;i++)
        printf("%d ",array[i]);

    return 0;

}
```

3.Again he told me to write a efficient code to find duplicate elements in an array if array contains large no. of elements.

Interviewer was testing how efficiently one can solve problems.

In HR round HR asked me about myself , my family , hobbies and Interests .
HR round was Nominal and he want to know how much I know about Valeo

----------> **3** <----------

2.technical round

1.program to swap the nibble
2.finding repeated elements
8051
pre_Q3.UART,I2C,
4.he asked me is it possible to call function from isr.(function definition in another fille).
5.what is deadlock how to over come it?

One processes is locked r1 resources and waiting for r2 resources availability where as another processes locked r2 resources and waiting for r1 resources availability ,so both processes are waiting for each other to relise the resources thi situation is called deadlock.

6.diff between asyn and syn?
7.what is baudrate?

8.diff between spi and i2c?(pins,mode)

-> let's first state that they both are "Master/Slave" protocols, i.e. communication is always initiated by one Master.
-> I2C only uses 2 wires, Clock & Data; Clock is unidirectional (mostly, though there is an exception) and Data is bidirectional. More than 2 devices can exist on the same bus, and they will still use 2 wires altogether (addressing is software-based).
-> SPI uses at minimum 4 wires, one Clock, one Data Out, one Data In, and one CS (chip select). So, Clock is always an output going from Master to slave(s), Data In is a input, and Data Out is a output. CS is a chip select signal, which allows one (among possibly several) slave devices. So, as we can see, addressing is done in hardware.

SPI is inherently faster (up to some 25MHz, maybe more), while I2C is slower (100-400KHz). This is inherently due to the use of more signals to perform communication (in fact, beyond else, I2C uses special sequences to show Start and Stop of communication, while SPI uses CS wire).

9.i2c read ,write algorithm.
10.he gave a number and asked to find the bit in the specific position.
11.if an interrupt fired how controller will work.
12.what is static function and global function?
13.what is constant variable?

3.hr round

1.it is like normal conversation only like intro about yourself,family backround.....
they will check only your confident and your attitude.

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There were three rounds.

First round:

Written test consists 70 questions(1st 20 question based on testing and QA and remaining were c,linux and controller questions) very easy questions.

2nd round:

Technical round was taken by one foreign guy.

He asked me

1.Find the avg. of elements in an array.

2.merge sort

3.1st array having M elements , 2nd array having N elements and i have to find largest L elements between 2 array and placed in another array.

I did this one but he told me to optimize the code means reduce the no. of iterations.

4.linked list questions

actually I am 2013 pass out and I have 2 years of exp. in electronics field.

5.He asked about my exp. and why you left the job.

6.program to draw patterns.

7.how many types of interrupts are there and how it works.

3rd round:HR round

They asked

1.Tell me about yourself and about my family

2.where u want see after five years

3.about my prev company exp

4.Some dead lock questions.

you have 3 days to complete the project but suddenly you felt sick and took leave for one day.In 2 days the work will not complete then what should you do??(over time is not allowed he said).

5.about salary

6.Can you interrelate the hardware and software because i have exp in electronics field.

At last they told me ok we will inform you by mail.

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1) Online Written test:

This contains 20 software testing questions and remaining 50 questions from C and Micro-controller interface.

2) Technical Interview:

They asked simple questions on c and 8051 micro-controller basic. They given normal C codes to write.

1. Write a function to reverse a single linked list using recursion.

2. Write a program to know a system is little endian or big endian.

3. Write a program to print a date using union.

4. Why we r using double pointer in case of formal arguments in linked list ?

5. Where is the information is there to free the dynamic memory ?

6.Find the output?

```
char x=0;
x--;
printf("%d",x);
```

7. Find the output.

```
int *p=1000;
int *q=2000;
int *z=p-q;
printf("%u",z);
```

8.What is DPTR ?

9. Where are we write the input for the micro-controller in Keil software.

10. What is Asynchronous and Synchronous and give its examples.

11. What is SPI and I2C ??

Here while coding u have to focus on code minimization.

3) HR Interview:

This round also easy one they are looking for communication and how you are interpreting to their questions. Questions are: -- Introduction, family back ground. -- where u want to see you after 5 years? -- which field you want to work? -- how many years you will stay in this company etc.

2.Technical Interview:

In this part a Technical guy from Egypt he taken my interview. He asked me one theory question

- What is Reentrance function?

Then he given normal C codes to write

1. to find the Factorial of a number.

2.to find the Factorial of a number using recursion.

3. one linked list is given which contains red nodes and blue nodes, the task is to divide that into two different linked lists like one contains only red nodes and other one contains only blue nodes without extramemory allocation.

4. given two arrays we have to put one array data into another but in reverse order same for other array also.

Here while coding u have to focus on code minimization.

3)HR Interview:

This round also easy one they are looking for communication and how you are interpreting to their questions.

Questions are:

-- Introduction, family back ground.

-- where u want to see you after 5 years?

-- which field you want to work?

-- how many years you will stay in this company etc.

Round 1: Written test...

based on C,C++...Questions on bit masking,bit shifting,DMA, function pointer,abstract class,reference variable,priority queue,etc...

Round 2 : Technical Interview....

- Tell me about urself.
- What is static variable.
- about static functions.
- about storage classes.
- What is meant by volatile keyword nd related questions about that.
- why we use copy constructor.
- issue of shallow nd deep copy.
- asked me to write programs on bit masking.
- about reference variable.

Round 3 : Technical HR..

- about B.Tech project.
- about Vector project.. Pls go through block diagram nd know about each nd every block clearly...
- about addressing modes..
- asked me to explain about addressing modes with examples.
- he written some instructions nd asked

me to explain what's happening in registers internally.

- about direct nd indirect addressing.. Nd explain it with example.
- to execute a program..to count no.of 1's in a given integer.
- Finally...they asked about company profile.

The entire process is of three rounds.

Round 1: written test

based on C,C++ objective type .Go through the notes thoroughly, its enough. Questions like what is abstract class,how many min nodes required in priority queue, some programs to predict the output etc.

Round 2:Technical round.

They asked about projects both b.tech and vector. Go through the projects deeply. Next they asked me to write program on setting a particular bit,reverse the string, logical questions on binary values, some questions on malloc, calloc. For others they asked in C++ like constructors, deep copy, shallow copy etc

Round 3:Technical +HR .

One of the foreigner interviewed us. He asked some questions on assembly language addressing modes. Given me registers their addresses and values and instructions on assembly language code and then asked me to find the values in the registers. Asked to write a program to count no.of 1's in a given integer variable. For others he asked to execute some small programs also.

1st round: written test.

20 questions -45mins -C,C++.

2nd round:Technical interview1

Pls go through ur project which we did in B.E. and some c questions.

3rd round:technical interview 2

Our project which we did in vector and some questions about registers in 8051.

Execute the program: count no of 1's in the given integer.