Valeo Online test Preparation

By Angad Samir

1- Pointers are not used to store the next data element of a list

2- The data structure with the ability to add and remove elements from both ends but not from the middle is called dequeue

3- The complexity of a merge sort Algorithm is $O(n \log n)$

4- Binary search tree is a tree whose left subtree is less than the root, while its right subtree is more than the root

5- Structures can be passed to functions by value

6- Arrays can't be passed to functions by value because arrays are pointers

7- The code: int(*a)[10]; implies:

a pointer to an array of 10 integers

8- finding the location of an element is called search

9- All reserved words are written in lower case

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10) to write 0XAA55 to Physical memory address 0X67A9:

```
*(uint16_t *Const)(0X67A9) = 0XAA55;
```

11) In the C programming we have:
Block Scope, function Scope, file Scope, program Scope

12) unsigned long Var1;
signed int Var2;
(Var1 + Var2;) in this case the Compiler will promote the two Variables to unsigned long

13) If int is 2 bytes on 2's Complement machine, then for the code below:

```
int X = -32768;
int Y = -X;
```

Y = -32768

14) the Number 0XFE When Interpreted as a signed 8-bit integer it will be: -2

15) Memory alignment of structures is Compiler dependent.

16) the code:

```
int *p;
*p = 20;
```

Will cause a run time error

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17) In case of Big Endian, if 0X12345678 is stored @ 0XFF0000, the memory dump that corresponds to it is:

0XFF0000 78 56 34 12

18) If you push 1, 6, 3, 5 in order in the stack, the one that will pop out first is 5

19) Modular design is needed to subdivide a system into smaller parts called subsystems.

20) The startup code doesn't assign the program entry address

21) The # pragma is used to: specify compiler & linker options

22) A reentrant function is a function that: can be interrupted during its processing, and then called again from within another task

23) Callbacks can implement asynchronous execution

24) Compilers used in embedded systems are: cross compilers

25) If X is an integer its size is not known at the moment, then the best way to initialize it to all 1's is X= 0XFFFF,

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26- The tool that combines object files or libraries and produces a single executable file is called Linker

27- It's not true that using the keyword register will make the compiler never ignore it

28- If we want to define a variable within the body of a function such that it maintains its value between functions invocations, this variable should be declared as static

29- When a function is defined as static its linkage is Internal

30- Macros aid in: Improving speed, overloading, porting

31- It is not recommended to use the keyword "goto" in (C)

32- Main constraints of embedded systems include:
1- Limited CPU power
2- Limited memory resources
3- Limited development budget
4- Limited power consumption

33- A PWM signal is characterized by frequency, duty cycle and not characterized by Rise time, fall time
↓
ON time, off time

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34- If a 16 bit µC is used with a 12-bit ADC to measure a signal with 5V max. The resolution is

$$\frac{5}{2^{12}} \simeq 1.2\ mV$$ (It should be called step)

35- When an interrupt event occurs, some actions are taken like:

1- Context is restored
2- Current program is stopped
3- Current program is resumed
4- Interrupt code is handled
5- Context is saved

36- A Timer peripheral can be used for:

1- generating delays
2- Generating periodic events

37- Suppose that a sender and a receiver exchange data via UART with following configuration:

Baudrate = 115200 bit/s
1 start bit, 2 stop bits, 8 data bits, 1 parity bit
16 clock periods used for sampling 1 bit
What is the required clock frequency?

$$\text{clock frequency (Hz)} = \frac{\text{no. of cycles}}{\text{sec}}$$

$$\therefore \text{frequency} = \text{Baudrate}\left(\frac{\text{bit}}{\text{sec}}\right) \times \frac{\text{no of cycle}}{\text{bit}}$$

$$= 115200 \times 16 = 1.8432\ MHz$$

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38- Interrupt response time is determined by:
1- Interrupt disable time
2- Interrupt vectoring time
3- Context saving time

39- UART communication is Asynchronous
, RS232 .. .. Asynchronous
I^2C .. .. Synchronous

40- The total time that a request spends in the system (Waiting time plus service time):
response time

41- What is used to reset the μC to the original state whenver some inappropriate events take place which can result in system malfunction
Watchdog Timer

42- If an RS232 byte has 8 data bits, 1 start bit, 1 stop bit and 1 parity bit, if the baudrate is 19000 baud, how many data bytes per second can be sent?
$= \frac{19000}{11} \approx 1727$

43- A system in which the time to respond to an external event must be bounded by a known, finite amount of time : Real Time System

44) In a non-preemptive system, after an ISR finish execution, the interrupted task may not continue execution because a higher priority task was activated
false

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45) first in-first out scheduling algorithm is non-preemptive

46) Number of mutexes used in a system is determined by no. of critical sections

47) In the hard real time systems, any late response or delay cannot be tolerated and will always be considered a failure True

48) A race condition occurs because accessing critical sections is atomic. false

49) calling & releasing semaphores represent mutual exclusion

50) A plan to overcome the risk is called Mitigation plan

51) Waterfall Model is characterized by being suitable for a software development project that has well defined requirements

52) To check whether we are developing the right product according to the customer requirements or not. The process is called Validation

53) In the traditional V-Model process, the first testing is done after the design of modules is finished false

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S4) The software verification & validation process doesn't provide management with insights into the state of a software project

S5) Power consumption in Idle Mode is not less than power consumption in power down mode

S6) A LIN Bus must have one Master node and all the rest should be slave nodes True

S7) These statements are true:
1- The dynamic design takes into consideration the Real time constraints of the software
2- The static design defines the different software layers, components & modules
3- The dynamic design of the software defines the scheduling algorithm and the interrupt management technique used

S8) An external event is sensed using polling with period p, It takes 100 cycles to process the event. processor frequency is 48 MHz, Before starting new period, the previous polling task should have finished. The relative deadline for processing an event is 10 μs, what is the minimum polling period?

$$\text{Time} = \frac{\text{no. of cycle}}{\text{no. of cycle/sec (freq)}} = \frac{100}{48 \times 10^6} = 2.083\,\mu s$$

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59) Control allways returns to the caller when the function terminates TRUE

60) Interrupt Nesting may result in:
1- Stack overflow
2- Interrupt saturation

61) Thread / Task / Child process (All are right) is a part of a process that can be executed in concurrent with the process itself and shares resources with its process

62) you are required to use an analog to digital converter to measure an analog signal that is susceptible to noise and interference, you need to filter the noise and measure a clean analog value, what are the possible SW solutions?

1- Aquire N consecutive samples & average then
2- Acquire N consequitive samples & select the most repeated value among the N samples

63) If an 8 bit timer used to measure the period of external signal, the two tollen samples was at count 60 & count 10, No. of overflow interrupts was one & the MC frequency is 1 MHz, Then the measured period is:

no. of counts = no. of overflow of the timer * Timer storage + (60 - 10)

$= (1 \times 2^8) + 50 = 306$

$\therefore$ period $= \frac{\text{no. of counts}}{\text{freq}} = \frac{306}{10^6} = 306\ \mu s$

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64) The Watchdog timer is used for.
Ensuring execution of the Software doesn't stay trapped in an endless loop or blocked state

65) for the same type and number of members:
structure will need more space than the union

66) Software architectural design doesn't focus on quality attributes

67) The main difference between EEPROM & flash is that Page size in flash is larger than Page size in EEPROM

68) Actual address to the physical memory where the module is saved is called physical address

69) Statements of services the system should provide, how the system should react to particular inputs and how the system should behave in particular situations
functional requirements

70) Arm Cortex M4 is a five stages pipe line architecture
false (it is 3-stages)

71) An Interrupt can be ignored in some systems by technique like Interrupt masking

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72) Suppose that a sender and a receiver exchange data via UART with following configurations:
- Baud rate = 115200 bits/sec
- 1 start bit, 2 stop bits, 8 data bits, 1 parity bit
- 16 clock periods used for sampling 1 bit

* How long does it take to transfer 10 Mbytes of data?

1- get bytes transfer rate:
every byte of data is accompanied by 4 extra bits for the UART
so the block that contains 1 byte of data is 12 bits

$\therefore$ rate of bytes transfer $= \frac{\text{Baud rate}}{\text{no. of bits 4 block}} = \frac{115200}{12}$

$= 9600$ byte/sec

2- $\therefore$ 10 Mbytes will take: $\frac{10 * 10^6}{9600} = 1041.67$ sec

73) Consider the following in a 32-bit MP (Pointers are 32 bit)
Char Array[][10] = {"apple", "Orange", "Banana"};
printf ("%c", Array[1][11]); $\Rightarrow$ a

74) A switch that has four positions, to transfer the switch position to a MC while keeping minimum I/O usage, it is better to use: Analog Voltag Divider

75) Linked list data structure is not indexed

76) The time taken for the system to start the handler for the specific interrupt is called Interrupt latency

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77) The Graph data structure has a many to many relationship

78) The Complexity of a linear Search algorithm is $O(n)$

79) In the traditional V-Model process the cost of change is very high

80) One of the project documents defines What has to be done by the software. It Should be initiated by the Customer to define the software interfaces With other software or hardware, and the software processing time and Code size Constraints.
The Software requirements specs

81) Normally IIC pins status are Pulled up

82) A data structure With the ability to add and remove elements from both ends but not from the middle is called: Dequeue (double ended queue)

83) For digital Outputs We Can Configure Slew Rate

84) If We have a hardware for a specific family of MCs It Will be connected as if it is the target micro controller itself to test the I/O ports and other functionalities in the system. This is called Emulation

85) The Use of test automation World provide the best return on investment for The integration testing

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86) The general solution to prevent deadlocks is to avoid cyclic relationship between synchronization objects ⇒ True

87) The MC peripheral that can be used as a sensor for reading PWM signals varying from 10% to 90% is capture timer

88) A MC simulator can be used to calculate time of simple functions ⇒ True

89) PWM input that has 2 messages in it can be read by: pulse width measurement

90) The #ifdef and #endif are used to remove code during preprocessing time

91) Examples of configuration management tools are: PVCS, clear case, Microsoft safe source, CVS, SVN

92) The sizeof() operator is evaluated at: Linker time (it should be compile time but not found in the choices)

93) RTOS that has a unique task per priority will only support fixed priority scheduling

94) When we need to port a software from one target to another the first action to do is: Compare between old & new targets peripherals

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95) If we defined an array as: int array[20], what will happen if I write arr[20]? → Warning

96) The role of the measurement team in a well organized software company is to:
support decision making process based on facts rather than judgements, and to track the project performance

97) Quick sort algorithm is not affected by the choice of the pivot

98) In blackbox testing:
The tester doesn't write test cases and only designs them

99) int * const X; is:
Constant pointer to variable integer

100) use the static keyword to limit the visibility of a variable or function to the current source file

101) a real time system is a system that has tasks with deadlines on their completion and guarantees that tasks are completed within deadlines

102) A foreground-background system structure is composed of: a single loop with interrupts

103) Hash functions are used in:
cryptography, cashes

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104) Interrupt latency is related to Interrupt response

105) Static Variables are Initialized once and retain its Value through program execution

106) Complexity of binary search algorithm is $O(\log n)$

107) Using the extern keyword informs the Compiler of the Variable type but doesn't allocate memory for it

108) The statement Char Ch = 'Z' Will Store in Ch ASCII Value of Z

109) #define NUMSTATICELS(PArray) (sizeof(PArray)/sizeof(*PArray)
The macro Will not calculate the number of elements in the array

110) Checks on requirements Consistency means Checking that there are no requirements conflicts

111) The Code : Printf("%d", (1 | 4)^13);
Will print : 8

112) Char *PA, PB ;
PA is a character Pointer, PB is a character Variable

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113) A Variable can be initialised during:
declaration, definition

114) A function prototype is used to:
Perform compile time checking when the function is called

115) The static keyword can be used for:
scope limitation, persistent storage

116) When a task is deleted this means:
The RTOS will not schedule the task any more

117) The dispatcher code is responsible for performing full context switching between 2 tasks (not interrupts)

118) Semaphores suffer from priority inversion True

119) Software testing is considered Software quality Assurance

120) Typical communication protocols used with external EEPROM chips are: I2C & SPI

121) A segment of code is to be executed from RAM.
It is target dependent, but if it is possible, this segment should be copied to RAM after each Reset

122) What is the arbitration policy of I2C communication?
The device that sends the first low bit wins

123) A CAN bus must have one master node and all the rest should be slave nodes (false)

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124) WHUP is not an SPI signal

125) Antilocking braking system (ABS) system can be considered as soft-real system false

126) Algorithm efficiency is mostly described by:
Time & space

127) A good hash function should minimize.
Collision rate

128) The clock skew is one of the disadvantages of the serial communication protocols false

129) scheduling in RTOS may be done at every RTOS call
True

130) The critical section allowed on a timer based solution to measure the duty cycle of a PWM signal that will vary from 10 to 95% with frequency 1 KHz is:
0.1 ms

131) Periodicity is not a real time constraint

132) Task stack is not a part of task context, CPU registers is a part of task context

133) Interrupt handling tasks are used to extend interrupts processing in conjunction with ISRs, which of the following is wrong:
ISRs are easier to debug compared to interrupt handling tasks

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