Digital Electronics and Microprocessor Systems (ELEC211)

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Week 1 – Lecture 01
Microprocessor Systems

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Question

How many ARM microprocessors were sold in the 3 month period that is the financial quarter reported in June 2019?

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Answer

5,600,000,000

- ARM7, 9, 11: 10% (18% in previous year)
- Cortex-A: 21% (20% in previous year)
- Cortex-R: 8% (9% in previous year)
- **Cortex-M: 61% (53% in previous year)**
- Figures quoted in SoftBank financial results.
- SoftBank receive an average royalty of about 5.5 cents for each ARM microprocessor.

Question

What is the equivalent of

$0011\ 1100\ 0100\ 0001\ 0101\ 0010\ 0100\ 1101_2$

in hexadecimal?

Hex ⇔ binary conversion

- The binary number:

$0011\ 1100\ 0100\ 0001\ 0101\ 0010\ 0100\ 1101_2$

converts to the following hexadecimal number:

$3C41524D_{16}$ or 0x3C41524D

0x denotes a hexadecimal number

Question

What does the following ASCII code say?

3C41524D2E504F57455245443E0D0A

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Answer

The ASCII code for

3C 41 52 4D 2E 50 4F 57 45 52 45 44 3E 0D 0A

is

<ARM.POWERED>\r\n

Where ‘\r’ is the carriage return and ‘\n’ is line feed.

Week 1 – Lecture 02
Microprocessor Systems

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Question

How many kibibytes are there in a gibibyte?

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Answer

There are 1048576 (2^{20}) kibibytes in one gibibyte

Since there are 1024 kibibyte in a mebibyte and there are 1024 ‘megs’ in a ‘gig’.

Question

For the ARM processor, how many words are there in a kibibyte?

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Answer

For the ARM processor there are 256 words in one kibibyte.

Since there are 1024 byte in one kibibyte and a word is equal to 4 bytes in a 32 bit processor.

Question

How many bits are there in a kibibyte?

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Answer

There are 8192 bits in one kibibyte.

Since there are 1024 byte in one kibibyte and a word is equal to 8 bits in a byte.

Question

How many bytes are there in 31 kibibytes?

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Answer

There are 31744 bytes in 31 kibibyte.

$31744 = 31 \times 1024$

Week 1 – Lecture 03
Microprocessor Systems

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Question

How many bits do we need to address the general purpose registers in the register bank?

Answer

The number of general purpose registers in the register bank is 15 (r0 to r14) and each of them can hold 32 bits.

So the required bits are

$$480 = 15 \times 32$$

Question

A 16 bit instruction is stored at addresses 0x00008002 and 0x00008003.

Where would the following 16 bit instruction be stored at?

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Answer

The next 16 bit instruction would be stored at 0x00008004 and 0x00008005 and so on.

Question

A 16 bit instruction is stored at addresses 0x00008004 and 0x00008005.

Where would the following 32 bit instruction be stored at?

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Answer

The next 32 bit instruction would be stored at addresses 0x00008006, 0x00008007, 0x00008008, 0x00008009 and so on.