Worksheet 02

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Question 1

Give an example of a binary number. (While a number such as "1" can be a binary, decimal, and hexadecimal number, try coming up with an example that better illustrates the differences between the different bases of numbers.)

Solution

Binary : Decimal

$$\begin{aligned} 0 &= 0 \\ 1 &= 1 \\ 10 &= 2 \\ 100 &= 4 \\ 1000 &= 8 \\ 10000 &= 16 \\ 11111 &= 16 + 8 + 4 + 2 + 1 = 31 \end{aligned}$$

Question 2

Give an example of a decimal number.

Solution

8 is a decimal number.
8745 is a decimal number.

Question 3

Give an example of a hexadecimal number.

Solution

$$
\begin{aligned}
Hexadecimal &: Decimal \\
0 &= 0 \\
5 &= 5 \\
A &= 10 \\
F &= 15 \\
2B &= 43 \\
100 &= 256 \\
F5A &= 3930
\end{aligned}
$$

Question 4

Convert the numbers $1, 10, 100, 1000$ and 10000 from binary to decimal.

Solution

$$
\begin{aligned}
1 &= 1 \\
10 &= 2 \\
100 &= 4 \\
1000 &= 8 \\
10000 &= 16
\end{aligned}
$$

Question 5

What is a compiler?

Solution

A compiler changes the source code into machine code.

Question 6

What is source code?

Solution

Source code is the code, that the programmer writes.

Question 7

What is machine language? (Don't just say binary. That's not correct.)

Solution

Machine language is the instructions in binary or hexadecimal form, that the CPU uses to perform a simple task. Machine language is also called machine code.

Question 8

What is a first generation language? (Don't just say binary. That's not correct.)

Solution

1GL is the same as machine code, where numbers represents the commands and data for the program.

Question 9

What is a second generation language?

Solution

2GL is assembly language where mnemonics represent commands. A mnemonic could be 3 letters.

Question 10

What is a third generation language? (Explain, don't just give one example.)

Solution

3GL is a programming language with a higher abstraction level than 2GL. Actual words can be used instead of mnemonics and therefore it is easier to understand and use than 2GL. Python is a 3GL.

Question 11

What is an interpreter and how does it differ from a compiler?

Solution

An interpreter translates source code directly into machine code at the same time that the computer receives the instructions. Python is interpreted and it has the advantage that it can be used on any platform, because each platform has its own platform specific interpreter.

Question 12

Search the web and find some of the most popular programming languages. List the website(s) you got the information from and what the languages are.

Solution

https://www.tiobe.com/tiobe-index//
Top 5 popular programming languages October 2018:
1. Java
2. C
3. C++
4. Python
5. Visual Basic.NET

https://www.codingdojo.com/blog/7-most-in-demand-programming-languages-of-2018/
The 7 Most In-Demand Programming Languages of 2018, data from November 2017:
1. Java
2. Python
3. JavaScript
4. C++
5. C
6. PHP
7. Perl

https://www.bitdegree.org/tutorials/most-in-demand-programming-languages/

Most In Demand Programming Languages, last updated August 2018:

1. PHP
2. JavaScript
3. C
4. Java
5. Perl
6. Python
7. C++

Question 13

Look at the job boards and see what languages people are looking for. List the languages and the job board you looked at.

Solution

Denmark
https://www.it-jobbank.dk/job/software-webudvikling October 2018:
1. .NET (47 jobs)
2. JavaScript (35)

3. Java (32)
4. PHP (9)
5. Python (8)

New York
https://www.indeed.com/jobs?q=programming+pythonl=new+yorkradius=25
Based on a search on indeed.com October 2018 in a radius of 25 miles of New York on the word programming + the 9 below programming language names the results returned are as follows:

1. Python (2037)
2. Java (1902)
3. C++ (1172)
4. JavaScript (997)
5. C (955)
6. C (768)
7. .NET (717)
8. Perl (354)
9. PHP (317)

Question 14

What is the difference between the "syntax" and "semantics" of a language?

Solution

The syntax is the rules the language has to follow in order to be correct. For example you need to put () after a function like this: print(). The semantics is the meaning of the different symbols, characters and words. A line of code can be syntactically correct, but semantically not make sense - in which case the program will not behave as the programmer wants. A syntax error is probably easier to find and correct than a semantic error.

Question 15

Pick a piece of technology, other than a computer you use regularly. Briefly describe the hardware and software that run on it.

Solution

I use a Samsung Galaxy S8+.

Hardware

The Galaxy S8 and S8+ both feature 1440p OLED displays, with an 18.5:9 (37:18) aspect ratio taller than the 16:9 ratio used by the majority of smartphones; the S8 has a 5.8-inch panel, while the S8+ uses a larger 6.2-inch panel. The displays on both devices curve along the side bezels of the

device, with minimal bezels that Samsung markets as an ”infinity display”, and the display panel itself has rounded edges. They use DCI-P3, offering what screen-testing website DisplayMate describes as the largest native color gamut, highest peak brightness, highest contrast rating in ambient light, highest screen resolution, lowest reflectance, and highest contrast ratio. The S8 features an octa-core Exynos 8895 system-on-chip and 4 GB of RAM; Both chips are manufactured by Samsung with a 10 nm process. They contain 64 GB of internal storage, expandable via microSD card.

$Software$

The Galaxy S8 launched with the Android 7.0 ”Nougat” operating system with the proprietary Samsung Experience (formerly TouchWiz) user interface and software suite. The software features a suite of assistant functions known as ”Bixby”, which is designed primarily to interact with Samsung’s bundled applications and other supported services. The feature allows the use of voice commands to perform phone functions, can generate cards shown on a home screen page (replacing the Flipboard integration formerly featured) based on a user’s interactions, and perform searches utilizing object recognition via the camera.Bixby supports third-party integration via an SDK.