RSN E.01

elias.bleckmann

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1 Task One

a) Wilhelm Schickard was the astronomer and mathematician, who invented and build the first "calculator". It could perform additions and subtractions with up to six digits.

b) The "Pascaline" was a mechanical calculating machine and was used to mechanically calculate.

c) It's fake news.

d) In the 50s a computer stopped working because a literal bug disabled it.

c) In 1965 G. Moore claimed that the transistor count on integrated circuits would double periodically without significantly increasing cost. Periodically meaning in one to two year intervals, commonly 18 month are assumed to be fairly accurate.

2 Task Two

a)

- Assembler $\rightarrow Machinelanguage$
- Computer architecture $\rightarrow Hardwareplatform$
- Circuit technology $\rightarrow Chips\ and(Logic-)Gates$
- Electrical engineering $\rightarrow Physics$

This hierarchical structure is used to allow humans to effectively communicate with the computer, without the knowledge of the entire process.

b) The transistor makes the physical creation of logical gates in electrical engineering possible.

c) The Von-Neumann architecture treats data and instruction as equal, while the Harvard architecture treats data and instructions separately, meaning it allocates the tasks to different processors.

d) The TrueNorth processor from IBM is not based on the classical von-Neumann architecture.

e) Analog computers use continuous signals to transmit data, while digital computers use discrete signals. At the time analog computing is less precise and slower than digital computing.

f) Billiard ball computing is the idea of using mechanical operations, the motion of billiard balls as a processor for computations. In theory the Billiard ball computer can perform task similar to conventional computers. The Fredkin gate consists of three bits. Is the first one a 1, the second and third get swapped, otherwise they stay unchanged.

3 Task Three

a)

- User $\rightarrow High-levellanguageandOS$
- Translator/Compiler $\rightarrow VirtualMachine$
- VM-Translator $\rightarrow Assemblylanguageb)Acompilerconvertshigh-levelcodeintoVMcode.$

c) Virtual machines are still used today, i.e. Java. They make programs hardware independent, meaning they can be used on every system with the virtual machine. However they reduce processing speed.

d) A stack machine processes in a "stack" meaning linear, while a register machine has registers who can perform computations parallel. (not sure)

e) Every processor which has the JRE installed can run Java byte code. The Java byte code is run by the virtual machine.

f) An assembly code is a low-level code designed for a specific processor. It can be compiled from high-level code or written directly.

g) Natan: Four motivational metaphors describing the unlimited potential of

software growth. Wirth: Pleads to write software as efficient(lean) as possible, even if more resources are available.

i) Wow, but why is it analog?

4 Task Four

a) An IP-address is the web equivalent of a post code. The IP stands for internet protocol.

- The IPv4-address is an address based on the 4^{th} version of the internet protocol. It consists of 32 bits, resulting in a maximum of $2^{32} = 4.294.967.296$ possible addresses.

-The IPv6-address has a maximum capacity of $2^{128} = 256^{16}$(= 340.282.366.920.938.463.463.374.607.431.768.2 address. Seriously, it's a lot..

Example IPv4: 192.168.178.118 my (slightly adapted) address.

Example IPv6: 2001:0db8:85a3:0000:0000:8a2e:0370:7344

b) Pinging google.com with my PC results in 172.217.23.174. Asking google what its IP-address is results in the ranges

-172.217.0.0 - 172.217.30.9

-216.58.190.0 - 216.58.223.9

The reason is that huge companies like google have multiple servers each running their own IPv4-address.

c) Our university does not support IPv6.

ie. Stuttgard and München do support IPv6.

If you are really interested here is a link (not really):

https://www.thomas–schaefer.de/HochschuleninDeutschlandmitinternet.html

d) RFC stands for Request for Comments and is the name for a publication from the Internet Engineering Task Force (IETF). Those documents set internet standards concerning the technical aspects of the web. The RFC 8200 for example specifies the IPv6